THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The establishment of the 1903 schedule of prices for Lake Superior ores on bases from 25 to 75 cents higher than in 1902 for the different groups, has been followed by negotiations for large lots of steel-making pig iron. The United States Steel Corporation is reported to be ready to buy all the Bessemer iron the merchant furnaces can give it for the second half, and the tonnage under consideration is put as high as 300,000 tons. It is expected that a considerable purchase will be closed within the coming week. Other buyers are also in the market for Bessemer as well as basic iron, and $20 at Valley furnace for both is under discussion. Eastern steel works have bought basic iron within the past week and a total of 50,000 tons of pig metal, chiefly basic and gray forge, is reported from Eastern Pennsylvania. Western buyers of gray forge are still holding off. An inquiry for 5,000 tons is up, in the Chicago district, but even at $16, which is $1 a ton below the price of some makers, consumers are not induced to cover. Chicago also reports 15,000 tons of basic iron under negotiation. The general market maintains the characteristic of the past several weeks—sustained and well distributed activity in finished lines and relatively little business in pig iron, particularly foundry and mill irons. Yet it is a question if gray iron foundries have taken contracts that represent any great tonnage of pig iron beyond what they have under contract. In respect to pipe works and rolling mills it is not so clear that business booked has been covered by pig iron purchases. Foundry iron for the second half is still quite well let alone by the average buyer. Sellers generally refrain from pushing for contracts for this delivery, but there is a very close watch on the situation for signs of any different policy on the part of furnaces not so well booked. The usual quotation of Central Western furnaces is $21 for No. 2 foundry. Foreign iron came in heavily in January, the imports of 1 ,000 tons being the highest month's record, barring December, since the movement begun. Prices have advanced rather sharply and Cleveland district and German irons at Atlantic port are 50 cents to 75 cents higher than 10 days ago. The week has added to the good outlook in finished material, the railroads being now reinforced by the steel corporation itself, for a $36,000,000 program of construction in blast furnace and steel works lines means that a vast amount of the material must come from the corporation's own plants. Indications grow that the year's output of iron and steel is to exceed that of 1902. Labor troubles may prevent, and some premonitory symptoms in this direction are not assuring. But the repetition of such a crop year as 1902, and the passing of May 1 without strikes of national significance, should give a record year in the iron trade, both in tonnage and profits. The buying of rails to the extent of 100,000 tons in the past week, much of the tonnage being for electric lines, brings the rail business for 1903 past 2,000,000 tons, with 400,000 tons additional carried over from last year. The new structural work closed includes 1,500 tons at Chicago for an industrial plant, to which 1,500 tons will be added later; 3,500 tons for Lackawanna Steel Co. buildings, 2,000 tons for railroad work and 2,700 tons for New York City. There have been good sales of bars and at Chicago two interests have advanced the price for bar iron to 1.90c. The promoters of the Western bar mill consolidation expect to launch the new enterprise this week. The sheet trade shows improved demand and firmer prices, but in some districts a large proportion of the sheet mills are still idle.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, March 4.

The rail market has been unusually active during the past week, contracts for fully 100,000 tons of standard sections having been placed for delivery the remainder of the year. Electric roads figured as heavy buyers, purchasing large tonnages for the laying of tracks for interurban systems which are now springing up all over the country. Considerable additional business is also expected in the very near future from these roads as the amount of new track to be laid this year promises to be greater than ever. This tonnage brings the total new rail bookings for the year up to about 2,000,000 tons, while the tonnage carried over from last year amounts to about 400,000 tons. The total tonnage will almost keep the mills filled up the remainder of the year, although some deliveries can be promised for November and December. The light rail market on the other hand is not as strong as the producers would like to see it and the spread between the lighter and heavier sections has been reduced fully 50 percent during the past two months.

Large interests, including the United States Steel Corporation, are negotiating for Bessemer iron for the last half of the year and it is expected that a price of $20 will be established at the furnace for contracts calling for large tonnages. Negotiations are also on for the purchase of basic iron for the latter half by a number of large interests, but no price has yet been established by the furnaces for this period, though $20 at furnace is discussed. The buying of foundry iron for second half delivery is light at this time. Reports of concessions from recently current prices, while difficult to substantiate, have encouraged the continuance of the waiting policy of buyers in hopes that still lower prices would be made. The rumored low prices have not been duplicated in transactions and furnaces generally are holding No. 2 foundry iron at $21.25 to $21.50, Pittsburg, while a few are even quoting as high as $22, delivered. For prompt delivery the range is from $23 to $23.50, while for delivery the remainder of this half $22 to $22.50 is asked. The additional foundry iron capacity that is to come in during the next six months will no doubt result in giving all the foundrymen throughout this territory an ample supply and this factor also has considerable to do with the unwillingness to cover for second half requirements.

In finished lines the market rules very strong, and the sheet market has shown more strength than for some time. Both the independent manufacturers and the American Sheet Steel Co. are holding No. 28 gauge at 2.75c in 500 bundle lots and over, indicating that both are receiving a fair tonnage. Two of the independent manufacturers this week withdrew their quotations of 2.70c, which they had been making for some time and which were preceded by quotations of 2.65c.

The steel corporation's program of new construction, as officially announced, means much for the Pittsburg, Wheeling, Valley and Cleveland districts. The Carnegie, National Tube Co. and National Steel Co. plants get the bulk of the appropriation.

The rolling mills throughout this entire district were visited

by the annual flood this week in the rising of the Monongahela, Ohio and Allegheny rivers. Few of the mills were idle more than one day, however. At Wheeling the mills suffered severe losses, however, and some of them will be idle for a week or ten days.

PIG IRON.—There has been little buying of either foundry or forge iron during the week as the low prices quoted in some quarters for second half delivery on No. 2 foundry led to the impression that still lower prices were to be made. Most furnaces are still holding their iron on a basis of $21 to $21.50, Pittsburg, while some are asking as high as $22. For prompt delivery in carload lots the ruling quotation is $23 to $23.50, and for delivery the remainder of this half, $22 to $22.50. Forge iron is firmer at $20.75 to $21. The Clairton Steel Co. will blow in its first stack within a month and the remaining two will be blown in from four to six weeks later. As this plant was securing iron from Valley furnaces that output will be offered elsewhere, amounting to fully 1,000 tons daily. Coke deliveries still hamper operations in both the Valley and Pittsburg districts and until additional ovens are in operation in the Connellsville region there is little hope for the furnacemen. We make the following quotations for delivery in the first half. Prices for the second half are 50 to 75 cents lower.

Bessemer, Valley	$21 00 to 22 00
Bessemer, Pittsburg	22 35 to 22 85
No. 1 Foundry	23 50 to 24 00
No. 2 Foundry	22 00 to 23 00
Gray Forge, Pittsburg	20 75 to 21 00
Chilled Basic, Valley	20 75 to 21 25
Chilled Basic, Pittsburg	21 35 to 22 10

STEEL.—We note the sale of 1,000 tons of German billets for western shipment equivalent to $30.75, Pittsburg, for delivery during April. Bessemer steel is held nominally at $30, but we can locate no sales. Open-hearth is held at $31.50 to $32 and upwards, according to analysis. Bessemer rods are firm at $36 at mill, while open-hearth are held at an advance of $1.

FERRO-MANGANESE.—The market continues quiet and prices are unchanged. Domestic ferro, 80 percent, is held at $50 at the furnace, while English manganese is quoted at $52.50, delivered in carload lots at buyer's mill, and in less than carload lots $55 is quoted.

MUCK BAR.—Western mills are still unable to compete with Eastern offerings at $33.50 to $34, at which small sales are being made. The Western manufacturers quote their product firm at $36, below which they assert they cannot sell at a profit.

SKELP.—The market is somewhat stronger than it has been for some time. Iron skelp, grooved and sheared, is held at 1.95c to 2c, while steel skelp, grooved and sheared, is quoted at prices ranging from 2c to 2.10c.

SPELTER.—The market is firmer and has slightly advanced. We quote prime Western grades at 5.92½c to 5.05c, in carload lots.

RAILS AND TRACK MATERIAL.—Contracts calling for fully 100,000 tons of rails were placed by steam and electric roads during the week. There is little change in the light rail market and the supply is more than equal to the demand. We make the following quotations: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 16 pounds and 20 pounds, $36; 25 to 40 pounds, $34 to $34.50. Track materials: Spikes, 2.15c to 2.25c; track bolts, square heads, 2.05c; hexagon heads, 2.65c; fish plates, 1.60c.

BARS.—We note the sale of 2,000 tons of iron bars at agreed quotations. New business in steel bars also continues good and the mills have made good bookings. Quotations remain unchanged as follows: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer under 3 inches, 1.70c; over 3 inches, 1.80c; bar iron, 1.80c Youngstown, or 1.84¼c Pittsburg, with freight added to point of delivery from Youngstown. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots.

PLATES.—While heavy consumers of plates have been large buyers since the first of the year the large jobbing interests have not yet placed their orders for future requirements, although there is every indication that they will do so at an early date. For prompt shipment plates continue to command a premium of $2 to $3 per ton. On large contracts for extended delivery agreement quotations are named as follows: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.75c; marine, ordinary, fire-box, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive fire-box, not less than 2.10c, and it ranges in price to 3c. Plate more than 100 inches, 5c extra 100 pounds. Plate 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5c extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

STRUCTURAL MATERIAL.—The contract for the new station of the Wabash railroad was placed last week, although the contract for the structural work has not yet been placed. About 5,000 tons of steel will be required in this structure. Light angles continue to command premiums of from $3 to $5 per ton for prompt shipment. Agreement quotations are as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

PIPES AND TUBES.—Should the demand for this material continue through the year as during the past two months the output of the mills will exceed all former records by more than 100,000 tons. The market is much firmer than for many months and the concessions offered by a few of the independents are only slight. Prices on carload lots, plus the freight to destination, are as follows:

MERCHANT PIPE.

	Steel		Guaranteed Wrought Iron	
	Black Percent.	Galv. Percent.	Black Percent.	Galv. Percent.
⅛, ¼ and ⅜ inch	68	58	65	55
½ inch	70	60	67	57
¾ to 6 inch	75	65	72	62
7 to 12 inch	73	63	70	60
Plugged and Reamed				
1 to 4 inch	73	63	70	60
Cut 3 to 6 feet				
⅛, ¼ and ⅜ inch	63	52	60	49
½ inch	65	54	62	51
¾ to 6 inch	71	60	68	57
7 to 12 inch	69	57	65	54
Cut 6 feet and longer				
⅛, ¼ and ⅜ inch	64	53	61	50
½ inch	66	55	63	52
¾ to 6 inch	72	61	69	58
7 to 12 inch	70	58	66	55
Extra Strong Plain End				
⅛ to 8 inch	69	59	65	55

Threads only—Same as Plain End, plus 1¼ percent net.
Threads and Couplings—Same as Plain End, plus 2½ percent net.

Double Extra Strong Plain End				
½ to 8 inch	61	51	57	47

Threads only—Same as Plain End, plus 2 percent net.
Threads and Couplings—Same as Plain End, plus 3 percent net.

NOTE: Orders for less than carload will be charged at 12½ percent advance. Extra and Double Extra Strong Cut Lengths, lower random discounts by 10 percent net for 6 feet and longer, and 15 percent net for 3 to 6 feet.

BOILER TUBES.

Steel.

	Percent
1 to 1½ inches	45
2¼ to 5 inches	62½
1¾ to 2¼ and 6 to 13 inches	52½

Iron.

	Percent.
1 to 1½ inches	36½
2¼ to 5 inches	45½
1¾ to 2¼ and 6 to 13 inches	35½

CASING.

	S. and S. Percent.
2 to 3 inches	58
3½ to 4 inches	60
4½ to 12½ inches	63

SHEETS.—Independent mills offering concessions on sheets have withdrawn their quotations entirely and 2.75c is now the lowest price that can be done on No. 28 gauge. New business is entirely satisfactory and the independent mills are now operating more steadily. Our quotations in 500 bundle lots and over are as follows: No. 28, 2.75c; No. 27, 2.65c; No. 26, 2.55c; Nos. 22 and 24, 2.45c; Nos. 18 and 20, 2.35c; Nos. 14 and 16, 2.25c; Nos. 10 and 12, 2.10c to 2.15c. Galvanized: No. 16, 2.60c; No. 18, 2.85c; No. 26, 3.35c; No. 27, 3.60c; No. 28, 3.85c; No. 29, 4.35c; No. 30, 4.50c.

WIRE AND WIRE NAILS.—The market remains firm throughout, jobbers reporting an excellent demand from the smaller trade. Despite the recent advance the mills also report that a good tonnage is being booked. We quote: Wire nails, carload lots, to jobbers f. o. b. cars, Pittsburg $2.00; plain wire, carload lots, $1.90; barb wire, carload lots, $2.30, staples, carload lots, $2.20. Galvanizing, 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel cut nails are quoted as follows: Carload lots, $2.10, and

less than carload lots, $2.15 f. o. b. Pittsburg, plus freight to point of destination. Iron cut nails are $2.20 in carload lots and $2.25 in less than carload lots. Terms, 60 days, less 2 percent off in 10 days.

MERCHANT STEEL.—Demand continues unabated in all lines. The shafting market is firm and quotations are being well maintained. We quote: Turned cold rolled and ground shafting, 47 off in carload lots and 42 percent off in less than carload lots; tire steel, 2.15c to 2.25c; spring steel, 2.25c to 2.35c; toe calk, 2.30c to 2.40c. The following differentials maintain: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance. Tool steel is quoted 7 cents and upwards, according to the grade.

OLD MATERIAL.—The inability of shippers to get material into this district continues to handicap both open-hearth and iron mill operations. The market is firm in nearly all lines, and premiums are offered for ordinary lots for immediate delivery. We quote, gross tons, as follows: Heavy melting stock, $21.00 to $21.50; low phosphorus melting stock, $25 to $25.50; steel rails, $21 to $21.25; re-rolling rails, $22.50 to $23; No. 1 cast scrap, $20.50 to $21; borings, $11 to $11.50; busheling scrap, $17.50 to $18.50; old iron rails, $24.50 to $25; turnings, $15 to $15.50.

COKE.—There is no weakening of the general coke situation. Foundry coke for prompt delivery commands from $6.50 to $7.50 at the ovens, while furnace coke is held firm at $5.50 to $6. The Connellsville *Courier* estimates the production of the upper Connellsville region for the week ending Saturday, Feb. 21, at 241,125 tons, and that of the lower region at 48,600 tons.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
519 MONADNOCK BLOCK, March 3.

There was a little better inquiry last week for pig iron for third quarter shipments than has been seen for some time, though it is still largely of a tentative nature. Producers are almost as much averse to selling iron for deliveries in the last half as melters are to buying, and it is scarcely probable that any general buying movement will be inaugurated until the car situation, and the coke supply dependent upon it, are defined more clearly. Furnacemen dependent upon outside interests for their supplies of fuel, have no assurance of getting coke in quantities that will guarantee continuous operation of their furnaces, nor do they know what the cost of fuel will be in the last six months of the year. Until these points are clearer the basis of values cannot safely be determined. There is still ample opportunity for improvement in the handling of traffic in this city, though Eastern roads have shown more expedition in the past week in delivering coke and coal. If the improvement continues, the Iroquois furnace, which is the only stack in this section out of blast, will have enough coke on hand to warrant blowing in, and this its owners expect will be done shortly.

There has been a good demand for basic iron during the week, for deliveries extending into the third quarter, the inquiries aggregating 15,000 tons. Some good sized contracts for gray forge and malleable pig iron are also pending. Actual sales of pig iron, however, were limited to small lots, usually for quick shipment. In finished lines, bar iron and steel, plates, rails and sheets have been most active. Local interests have advanced the price of bar iron to the basis of 1.90c Chicago; and plates have also gone up $2 a ton on account of the crowded condition of mills. Sheets which have been lagging have assumed a firmer tone. Wire products are in good demand, manufacturers experiencing no trouble in getting the advanced prices. Merchant pipe and boiler tubes are moving briskly. The scrap market is without change, with the exception that a scarcity of stove plate and light cast prevails.

PIG IRON.—This market is dull and featureless, and waiting continues. Buying is limited to such foundries as require iron to tide them over until July 1, and sales invariably range from 500 tons down to carload lots. The total tonnage is not large, few furnaces having iron for the first half to sell. Iron on track is in relatively good demand, and its scarcity has pushed the price into the neighborhood of $25 Chicago. Some large inquiries for basic iron and gray forge have been sent out in the past week, the total tonnage of the former aggregating 15,000 tons, and of the latter about 5,000 tons. Several consumers of malleable and silvery irons have been in the market for small lots for quick shipment. We quote as follows, the maximum price being for delivery prior to July 1:

Lake Superior Charcoal	$26 50 to 27 50
Local Coke Foundry No. 1	23 50 to 24 50
Local Coke Foundry No. 2	23 00 to 24 00
Local Coke Foundry No. 3	22 50 to 23 50
Local Scotch Foundry No. 1	24 00 to 24 50
Southern Coke No. 1	22 85 to 23 35
Southern Coke No. 2	22 35 to 22 85
Southern Coke No. 3	21 85 to 22 35
Southern Coke No. 4	21 35 to 21 85
Southern No. 1, soft	22 85 to 23 35
Southern No. 2 soft	22 35 to 22 85
Southern Gray Forge	21 35 to 21 85
Southern Silveries (according to silicon)	26 15 to 27 15
Jackson Co. Silveries, 6 to 8 percent silicon	31 20 to 32 30
Ohio Strong Softeners	26 30 to 26 80
Alabama and Georgia Car Wheel	27 35 to 28 35
Malleable Bessemer	23 00 to 24 00
Standard Bessemer	23 30 to 24 30
Basic Iron	22 35 to 22 85

BARS.—The two leading local producers of iron have advanced the price to the basis of 1.90c Chicago on small lots, though not much iron is being sold at this price. At the time of writing, the bar iron combination has not been effected, but its promoters anticipate the deal will go through this week. There has been a good demand for both iron and steel during the week, the sales of one company aggregating 20,000 tons. Specifications are keeping up to their past proportions, and the quick shipments desired by many indicate a low level of stocks in consumers' warehouses. Store trade has also been active and prices are without change. We quote as follows, mill shipment, Chicago delivery: Bessemer steel, 1.76½c; angles, less than 3x3, 1.86½c base; hoops in lots of 250 tons and greater, 2.06½c; less than this amount, 2.16½c; iron 1.86½c to 1.91½c. Store prices are as follows: Steel, 2c to 2.10c; iron, 2.15c to 2.20c; hoops, 2.40c to 2.45c; angles, 2.25c rates.

SHEETS.—A better trade has developed in the past week in both black and galvanized sheets, and prices are firmer than they have been for some time. We quote No. 27 black, 2.76½c to 2.86½c; No. 28, 2.86½ to 2.91½c; galvanized, No. 27, 3.35c to 3.45c. For deliveries from stock, No. 27 black, 2.95c, and galvanized 75 and 5 percent.

STRUCTURAL STEEL.—Contracts have been let by the Allis-Chalmers Co. for the addition to its Gates Iron Works plant in this city, which will require about 1,500 tons of steel shapes. An addition is also to be built to its Washtenaw Ave. plant this spring, which will require an equal amount of material. In small lots, business has been brisk with both mills and jobbers. Serious complaint is heard on all sides owing to the belated deliveries of material, one month being required for a car to reach Chicago from Pittsburg, whereas the usual time is only five days. We quote mill prices, Chicago delivery: Beams and channels, 15 inches and under, 1.75c to 2c; 18 inches and over, 1.85c to 2.10c; universal plates, 1.75c to 2c; angles, 3x3 and larger, 1.75c to 2c; tees, 3x3 and larger, 1.80c to 1.90c; zees, 1.75c to 2c. The maximum quotation is asked by some sellers on lots for quick delivery. Material from store cut to length, 2¼c to 2¾c per pound.

PLATES.—Except to favored customers buying in large lots, the local mill and leading jobbers have advanced the price of plates $2 a ton. This has been necessitated by the recent heavy buying, which has filled up leading mills practically for the entire year. The local producer reports that it accepted contracts last week for 2,000 to 3,000 tons of material, for such deliveries as it can give in the closing months of the year. Store trade has been heavy in consequence of the inability of consumers to get satisfactory deliveries from mills. We quote mill shipments, Chicago delivery, as follows: Tank steel, 1.75c to 1.95c base; flange steel, 1.85c to 1.95c base. Prices from stock, tank steel, ¼ inch and heavier, 2.15c to 2.25c; 3-16, 2.25c to 2.35c; No. 8, 2.30c to 2.40c; No. 10, 2.35c to 2.45c; flange steel, 2.40c to 2.50c.

RAILS AND TRACK SUPPLIES.—Such mills as can give deliveries are in daily receipt of orders for heavy sections in lots of 2,000 to 5,000 tons. These come largely from electrical roads. There has been a good demand for both light rails and track supplies. We quote heavy rails, $28; second quality, $27; light rails, 45 pounds, $34 to $35; 12 pounds, $40 to $41, with regular differentials for intermediate sizes. Track supplies, mill shipments, are quoted as follows: Angle bars,

2c to 2.10c; spikes, first quality, 2.25c (out of store, 2.40c to 2.50c rates); second quality, 2.15c; track bolts, 3½x¾, with square nuts, 2.85c to 3c per 100 pounds; with hexagon nuts, 3.05c to 3.15c, with usual differentials for other sizes.

MERCHANT STEEL.—Mills report no change in the situation. Buying has been of limited proportions, owing to inability to take care of more orders. Specifications are numerous, full quotas being asked for. We quote mill shipments, Chicago delivery, as follows: Spring steel, 2.65c to 2.75c; sleigh shoe, 1.95c flat sizes; concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.50c to 2.60; machinery steel, 2.15c to 2.25c base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.30c to 2.40c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots 5 to 10 percent higher; cold rolled shafting, carload lots, 47 percent off; less than carload lots, 42 percent off.

MERCHANT PIPE.—There is no diminution to be noted in the demand, jobbers placing their contracts freely for all sizes of pipe. There is no change in prices, which we quote to consumers, mill shipments, carload lots, random lengths, f. o. b. Chicago, as follows:

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ to ¾ in inclusive	66.35	56.35	63.35	53.35
⅜ inch	68.35	58.35	65.35	55.35
¾ to 6 inches, inclusive	73.35	63.35	70.35	60.35
7 to 12 inches, inclusive	71.35	61.35	68.35	58.35

Less than carload lots, 12½ percent advance over above prices.

BOILER TUBES.—Buying of boiler tubes has been better in the past week than for some time. A change has been made in the quotations on steel tubes for lots from store, the discount being increased. Our quotations below are for carload lots mill shipments, f. o. b. Chicago. On less than carload lots from mill, 12½ percent is to be added.

	L. W. Steel Percent.	C. C. Iron Percent.
1 to 1½ in	43.35	38.35
1¾ to 2½ in	55.85	35.85
2¾ to 5 in	60.85	45.85
6 to 13 in	55.85	35.85

For lots direct from warehouse stock:

	L. W. Steel Percent.	C. C. Iron Percent.
1 to 1½ in	40	35
1¾ to 2½ in	50	32½
2¾ to 5 in	57½	42½
6 to 13 in	50	32½

CAST IRON PIPE.—The buying has been light, being reduced to such small lots for repairs as come in the daily mail. We quote f. o. b. Chicago, 4-inch water pipe, $34; 6-inch, $33; 8-inch and upwards, $32; gas pipe $1 a ton higher.

BILLETS AND WIRE RODS.—Though there are several inquiries in the market, we hear of no sales. We quote wire rods (the last sale) $37.50 Chicago; domestic Bessemer billets, $31.50; open hearth billets for forging purposes, $36 to $38; for use in rolling mills, $32.50 to $33. German basic Bessemer billets, Chicago delivery, $30.50 to $31. Special carbons are higher.

WIRE NAILS AND FENCING.—There has been a good demand for all wire products, and manufacturers experience no trouble in getting the advanced price. Bale ties have also been advanced 5 percent. We quote prices to jobbers, Chicago delivery, as follows: Wire nails, carload lots, $2.15; less than carload lots, $2.50. Plain wire, carloads, $2.10; smaller lots, $2.20; galvanized, carloads, $2.40; smaller lots, $2.50. Barb wire, carloads, $2.50; smaller lots, $2.60; galvanized, carloads, $2.80; smaller lots, $2.90. Staples, carloads, $2.30; smaller lots; $2.40; galvanized, carloads, $2.60; smaller lots, $2.70. Cut nails, carloads $2.26½; smaller lots, $2.36½. Bale ties, to jobbers 85 percent discount f. o. b. Waukegan on straight car load lots. Poultry netting to jobbers, 85 and 5 percent discount from list f. o. b. Joliet or DeKalb, with actual freight allowed, not exceeding 50 cents per 100 pounds.

COKE.—Larger supplies have been brought into this city in the past week and furnaces and foundries are in better shape than for some time. However, there is still room for considerable improvement and the supply is far short of the needs. Coke on track commands a variety of prices, an average being for Southern coke, $9 to $9.50, and Connellsville, $10 to $10.50.

OLD MATERIAL.—There is no change in the situation, buying being reduced to a minimum. The market undoubtedly will be stimulated as soon as the bar iron combination is consummated. At the present time, none of the mills concerned is seeking scrap. Foundries are active buyers of stove plate and light cast, of which there is a scarcity. We quote gross tons as follows:

Old iron rails	$23 50 to 24 00
Old steel rails (mixed lengths)	18 00 to 18 50
Old steel rails (long lengths)	22 00 to 22 50
Relaying rails	31 50 to 32 00
Old wheels	23 00 to 23 50
Heavy melting steel	17 00 to 17 50
Mixed country steel	15 00 to 15 50

The following are selling prices per net ton:

No. 1 R. R. wrought	$19 50 to 20 00
No. 2 R. R. wrought	18 00 to 18 50
Shafting	19 00 to 19 50
Dealers' forge No. 1	16 50 to 17 00
No. 1 busheling and wrought pipe	14 00 to 14 50
No. 1 cast	16 50 to 17 00
Railway malleable	15 50 to 16 00
Country malleable	14 50 to 15 00
Iron axles	23 50 to 24 00
Steel axles	19 50 to 20 00
Cast borings	10 00 to 10 50
Mixed borings, etc	9 50 to 10 00
Wrought turnings	13 50 to 14 00
Machine shop turnings	13 00 to 13 50
Iron axle turnings	14 00 to 14 50
Steel axle turnings	13 50 to 14 00
Stove plate and light cast scrap	12 50 to 13 00
Old iron splice bars	21 00 to 21 50

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROBB BUILDING, March 4.

The prevailing opinion in local iron circles is that prosperity fully equal to that of last year will continue through 1903 as signs of activity are seen in all directions, while nowhere is there indication of any recession. The general testimony is that the business of the first two months equals that of January and February of 1902. It is believed that the only cause for apprehension lies in the possibility that the volume of business will be larger than can properly be carried on with the present financial system of the country. The failure of Congress to enact any legislation to allow an expansion of the currency causes disappointment, but it is pointed out that the conservative policy of the principal producers of iron and steel, with the tremendous financial interests connected with those companies, will exert a powerful influence in preventing embarrassments which have occurred in other years.

IRON ORE.—News from the upper lake ports is that there is not as much ice as at this time a year ago and the present outlook is that vessels will be started very soon after April 1. As the lower lake docks will hold fully 4,000,000 tons of ore at that time, the amount which can be handled will depend upon the ability of the railroads to transport the ore to the furnaces. Although new equipment has been added by all the railroads, the hard usage to which locomotives have been subjected during the winter on account of the unusual demands made upon them, has resulted in many of the older engines being sent to the shops for repairs, and it is not expected that the carrying capacity of the railroads at the opening of navigation will be much larger than it was last year. There has been some discussion as to ore freights. Some of the leading vessel men declare that they will demand $1 from the head of the lakes, but it is probable that the rate will be 80 or 85 cents, or five to ten cents more than last year.

The various merchant ore companies have not yet announced their prices for 1903, though there is no reason to expect any deviation from the basis outlined in this column one week ago. The suggestion of three divisions for Mesabi ores, on the basis of physical characteristics, has been given up, the variety of ores being so great that each will have its own price, determined by a somewhat complicated computation of its value gauged by the double standard of chemical and physical qualities.

COKE.—The coke situation is slightly improved, but foundries find it very difficult to get adequate supplies. The prices are still $7 to $7.50 for spot and $5.75 for the first half for Connellsville foundry at the ovens. The Struthers Furnace Co.'s blast furnace at Struthers, O., which had so much difficulty in getting coke the last three months of last year that it was banked about two-thirds of the time, has been running without a stop this year, since it obtained a new source of supply.

PIG IRON.—There is a strong demand for basic and we note sales for delivery within the next four months at $20.50 at

the furnace. For the second half negotiations for large tonnages are pending, based on $20 at the furnace on every desirable orders. For Southern Ohio No. 2 foundry, $22 at the furnace is asked for the next six months. For the first half, the Valley price is $22 for No. 2, or $22.85 Cleveland. Furnaces are writing to sales agents not to push sales and the usual quotation for the second half is $21, Valley, for No. 2. We quote as follows, f. o. b. Cleveland, for shipments in the first half of 1903:

Bessemer	$21 85 to 22 35
No. 1 Strong Foundry	23 00 to 23 50
No. 2 Strong Foundry	22 50 to 23 00
No. 3 Foundry	21 75 to 22 25
Scotch No. 1	23 00 to 23 50
Scotch No. 2	22 50 to 23 00
Gray Forge, Valley	20 00 to 20 25
Lake Superior charcoal	26 50 to 27 50

FINISHED MATERIAL.—There is a good demand for nearly all kinds of finished material. The agreed price, 1.80c Youngstown, for bar iron is being rigidly adhered to by the principal producers and less is heard about Western competition. For steel bars, very fair business is being done at 1.70c for open-hearth and 1.60c for Bessemer, Pittsburg, and 1.65c for mill tonnages of less than a car load. Agreement quotations on structural material are as follows: Beams and channels, 3 to 15 inches, 1.70c; 18 to 24 inches, 1.80c; tees, 1.75c; zees, 1.70c; angles from 3 to 6 inches, 1.70c; universal mill plates, 1.70c. Inquiries for structural material are numerous, but specifications are coming in slowly. Jobbers are not making much effort to sell, as they believe they will be able to obtain premiums next summer as they did last summer. The sheet market shows more signs of life and cutting is not so frequent. The prices of the principal producers, through jobbers, are as follows: For 3-16-inch sheets and heavier, 2.15c, Cleveland. Mill sales of black sheets, Cleveland, to consumers: No. 24, 2.65c to 2.75c; No. 26, 2.75c to 2.85c; No. 27, 2.85c to 2.95c; and the following prices out of stock: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.50c to 2.60c; No. 16, 2.55c to 2.70c; Nos. 18-20, 2.75c to 2.90c; Nos. 22-24, 2.85c to 3c; Nos. 25-26, 2.95c to 3.10c; No. 27, 3.05c to 3.20c; No. 28, 3.15c to 3.30c. On galvanized sheets we quote mill sales in carload lots, Cleveland, as follows: Nos. 10 and 11, 2.60c; Nos. 12-14, 2.70c to 2.85c; Nos. 18-21, 3c to 3.15c; Nos. 22-24, 3.30c to 3.45c; Nos. 25-26, 3.55c to 3.70c; No. 27, 3.80c to 3.95c; No. 28, 4.05c to 4.20c; No. 29, 4.45c to 4.60c; No. 30, 4.95c to 5.10c. Galvanized sheets out of stock are quoted at 75 and 2½ off.

OLD MATERIAL.—The prices of scrap are firm and the tendency is upward. Car wheels have advanced $2, railroad wrought scrap $1 and steel boiler plates $1. Malleable iron (railroad) is not in such strong demand and the price has declined $1. All the machine cast scrap that dealers can buy finds a ready market. Pittsburg buyers are bidding high for low phosphorus material, which is scarce, and some dealers are not willing to sell under $25 while others are quoting such scrap as plate shearings, low in phosphorus, but not guaranteed, at $23.50 to $24. We quote Cleveland delivery, all gross tons, as follows:

Old iron rails	$25 00 to 26 00
Old steel rails (over 6 feet)	22 00 to 23 00
Old steel rails (6 feet and under)	20 00 to 20 50
Old car wheels	24 50 to 25 00
No. 1 R. R. wrought scrap	22 00 to 22 50
Mill scrap	19 00 to 19 50
No. 1 machine cast scrap	21 00 to 21 50
Iron axles	29 00 to 30 00
Steel axles	28 00 to 29 00
Axle turnings	18 00 to 19 00
Wrought turnings (free from cast)	16 00 to 17 00
Cast borings	11 00 to 11 50
Uncut wrought iron boilers	12 00 to 13 00
Steel boiler plates	18 00 to 19 00
Grate bars	13 00 to 14 00
Pipes and flues (clean)	17 50 to 18 50
Tank iron	17 00 to 18 00
Hoop and band iron	13 50 to 14 50
Sheet iron	12 00 to 13 00
Wrought drillings	15 50 to 16 50
Malleable iron (railroad)	19 00 to 19 50
Malleable iron (agricultural)	17 50 to 18 00
Stove plate	16 00 to 17 00
Heavy steel	19 00 to 20 00

CINCINNATI.

March 3.

General conditions show no change. The coke market remains firm at $8.50 to $9 f. o. b. Cincinnati for quick delivery.

PIG IRON.—Trading is still confined to small lot transactions and these sales are on the basis of prices recently prevailing. Buyers are still maintaining their waiting policy. We hear of no contracts to cover future needs. While buyers are still talking lower prices, sellers are becoming more confident each day that the wait on the part of consumers of pig iron is nearing an end. There is no pressure to sell and prices have not receded now for several weeks. For No. 2 foundry $18 Birmingham is inside. Small lots are selling between $18 and $18.50, Birmingham. In the lower grades of iron there is nothing new to report. Some talk of sales in St. Louis territory and the West, at prices under $16, Birmingham, for gray forge is heard, but in this territory $16 to $16.50, Birmingham, about represents the trading basis. It is well established now that $17 to $17.50, which has been reported as the schedule, is too high to be regarded as a quotation; in fact there is some little trading being done in odd lots of mill irons as low as $16, Birmingham, to clear furnace yards. The Northern furnaces are still selling most of the foundry iron in Northern and Eastern Ohio and are doing some business in Southern Michigan, but Southern furnaces are still inclined to bide their time and are not attempting to meet competition by any special shading of prices. There appears less disposition to contest for small orders among producers and sales agents are more inclined to quote what they regard as a reasonable price, without following it up, as such procedure has a tendency to result in price shading to secure orders. The feeling among sellers is one of steadiness and confidence and a disposition to maintain current values even though the demand is exceedingly light and trade quiet. We make no change from prices quoted last week for quick delivery and first quarter of 1903, f. o. b. Cincinnati:

Southern Foundry No. 1	$22 00 to 22 50
Southern Foundry No. 2	21 25 to 21 75
Southern Foundry No. 3	20 75 to 21 25
Southern Foundry No. 4	19 75 to 20 75
Southern Foundry No. 1, soft	22 00 to 22 50
Southern Foundry No. 2, soft	21 25 to 21 75
Gray Forge	19 25 to 19 75
Northern Foundry No. 1	24 15 to 24 65
Northern Foundry No. 2	23 15 to 23 65
Southern car wheel iron	28 25 to 28 75

FINISHED MATERIAL.—The market holds steady with an increasing demand for nearly all lines. The retail business in bars and sheets as well as structural has increased during February about 25 percent, through the local distributing concerns. Buyers show more disposition to take fair sized lots. Plates are again attracting attention and deliveries are less prompt, both on account of difficulty in obtaining them from the mills and on account of transportation troubles. Prices for bar iron in carload lots are: 1.90c base, half extras f. o. b. Cincinnati; steel bars, 1.73c base, half extras f. o. b. Cincinnati. Both are retailed at 2.20c base, full extras out of store. Sheets are in fairly active demand and steady. We quote black sheets No. 27 at 2.78c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 3.10c; No. 27, 3.00c; No. 16, 2.70c; No. 14, 2.60c; No. 12, 2.50c; No. 10, 2.40c. Galvanized sheets in car lots sell at 75 and 10 percent off; less than car lots 70 and 10 percent off. Tank plates are firm and sell out of store at 2.25c for ¼-inch and 2.35c for 3-16-inch. The demand for structural iron is increasing. The scarcity of cars is making it difficult to get prompt movement of long pieces requiring two cars for loading, and the railroads have requested that stock orders be placed for as small pieces as possible instead of ordering the long pieces and cutting them to order on arrival. Beams and channels are quoted at 2¼c to 2¾c from stock, and angles at 2.15c to 2.25c for base sizes. In merchant pipe the situation is stronger as the demand is catching up with the output of the independent mills and the leading interest is confident of being able to obtain the bulk of the business in the near future at schedule prices because of advantages in making deliveries. In the meantime the market continues a little irregular with independents still shading prices on the larger sizes, but on the smaller sizes, from 2 inches down the market is firm. Merchant pipe and boiler tubes are quoted as follows for carload lots f. o. b. Cincinnati:

MERCHANT PIPE.
(Basing discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛, ¼, ⅜-inch	66.8	56.8	63.8	53.8
½-inch	68.8	58.8	65.8	55.8
¾ to 6-inch, inclusive	73.8	63.8	70.8	60.8
7 to 12-inch, inclusive	71.8	61.8	68.8	58.8

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ in	43.8 & 5	38.8 & 5
1¾ to 2½ in	56.8 & 5	36.8 & 5
2¾ to 5 in	61.8 & 5	46.8 & 5
6 to 13 in	56.8 & 5	36.8 & 5

OLD MATERIAL.—The demand is fair and the market holds steady and unchanged. We quote:

Old No. 1 wrought railroad, net tons	$18 50 to 19 00
Cast machine and foundry, net tons	17 00 to 17 50
Old iron rails, gross tons	22 50 to 23 00
Old steel rails, gross tons	21 50 to 22 00
Old short lengths, gross tons	17 50 to 18 00
Old iron axles, net tons	27 00 to 27 50
Old chilled car wheels, gross tons	22 00 to 22 50
Stove plate, net tons	11 50 to 12 00
Wrought turnings, net tons	15 00 to 15 50
Cast borings, net tons	12 00 to 12 50

NEW YORK.

OFFICE OF *The Iron Trade Review*,
Room 1909, No. 150 NASSAU ST., March 3.

PIG IRON.—The market in this vicinity, during the past week, was notable for the strength displayed by foreign irons, due to increased demand from continental as well as American sources. During the past fortnight both English and German brands have been advancing, and today are selling from 50 cents to 75 cents a ton higher. Middlesboro No. 3 cannot be purchased now in large lots, New York delivery, duty paid, for less than $18.50, whereas ten days ago a good customer could perhaps obtain it at $17.75 or $18 at the highest. German iron, under the conditions previously noted, sold about ten days ago in the neighborhood of $20, but some firms here have made sales during the past week at $20.75, one seller disposing of about 3,000 tons at about that figure. In both brands inquiries have shown a marked increase in inquiries recently, particularly for immediate delivery. At this writing shipment cannot be promised before the end of the present month, and some concerns say they cannot do better than the first week in April. Some prospective buyers are not pleased with the conditions, expecting that with the terms of sale agreed upon immediate shipment should follow. It is reported here that on account of improved conditions in the iron and steel industry, in Germany, consumers in that country have been getting their iron from English and Scotch furnaces, particularly the former, and this is said to be a factor in the recent advances in English brands. Foreign furnaces entertain high hopes of American trade in the near future, and expect a buying movement from this side to set in shortly, and to represent a large tonnage. In American irons the situation described in previous letters remains unchanged. Buying continues to be of the "hand to mouth" variety, and while the hope that easier prices will prevail is not so strong, there is still no disposition to contract for American iron. The fuel situation is now more acute than it has been for weeks. We quote: No. 1 X Northern, $23.25 to $24.25; No. 2 X, $22 to $22.75; No. 2 plain, $21 to $21.75; Southern No. 1 foundry, $23 to $23.50; No. 2 foundry, $20 to $22.50; No. 3 foundry, $21.50 to $22; No. 4 foundry, $20.50 to $21.

BILLETS.—The market for German billets is characterized by a stronger undertone than for some months. Reliable quotations are difficult to obtain, and all sales are dependent on cable confirmation. One firm here reports that its sales during the week amounted to over 10,000 tons with delivery as a general rule nearer the early part of April than before it. Prices for New York delivery, in large lots, duty paid, are about $28 for basic Bessemer and $29 for open-hearth billets.

FINISHED IRON AND STEEL.—Business is chiefly confined to structural material, in which an excellent and increasing demand appears. During the week the American Bridge Co. closed contracts with the Lackawanna Steel Co. for 3,500 tons, for its new plant in the suburbs of Buffalo, N. Y.; with the Missouri Pacific Railroad for 2,000 tons; the Buffalo, Rochester & Pittsburg, and Pittsburg, Shawmut & Northern Railroad for 500 tons each; and with the City of New York for 2,700 tons for use on the new Croton water shed, this being the largest contract the company has received for highway work in several years. Labor troubles are occasioning the structural mills considerable concern now, and strikes directly or indirectly affecting structural work are increasing, with a strong belief that between now and April 1 serious disturbances in this connection are likely to ensue. Both inquiries and actual sales in plates have shown an improvement recently, with the outlook in both directions very favorable. Sheets have a better surface aspect, but trading is extremely limited. In bars orders for small lots are plentiful, but no orders of any magnitude are being placed. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 2.10c to 2.15c; flange, 2.25c to 2.30c; fire box, 2.30c to 2.50c; refined iron bars, 1.95c to 2.10c; soft steel bars, 1.95c to 2.10c; steel sheets, in carloads, New York, No. 28 black, 3.05c to 3.10c; galvanized, 75 and 7½ off.

PHILADELPHIA.

March 3.

The volume of business in the past week has been large and prices in nearly all lines are tending upward. Foreign markets are fully 50 cents per ton higher on pig iron. Prospects for continued activity are bright. There has been some improvement in transportation matters, but furnaces still complain of inability of railroads to handle their stock.

PIG IRON.—Several large deals for gray forge and mill iron have been closed. The demand for basic has been strong, but there is very little obtainable for delivery prior to July. Prices for some brands have advanced 25 to 50 cents per ton. We quote as follows: No. 1 X foundry, $23.50 to $24; No. 2 X foundry, $22.25 to $22.75; No. 2 plain, $21.50 to $22; gray forge, $19.50 to $20.50; Middlesboro, No. 3, $21 to $21.50; Scotch, $22.50 to $23.50; basic, $19.75 to $20.50.

BILLETS.—Arrivals of steel from Belgium are large and there is good demand for both foreign and domestic. American is selling at $31 to $32 and German $27.50 to $28.

FINISHED MATERIAL.—There is as much business as mills are ready to accept at present prices. The demand for plates and shapes is very strong. We quote as follows: Plates, small lots, 2.10c to 2.15c; carload lots, ¼ inch and thicker, 2c to 2.05c; universals, 2c to 2.05c; flange, 2.10c to 2.20c; firebox, 2.25c to 2.30c; marine, 2.30c to 2.35c. Steel bars, 1.80c to 1.90c; prompt shipments from local mills. Western steel, 1.75c to 1.80c; bar iron, 1.93½c to 1.98½c for carload lots as minimum quantity. Structural material in small sizes is quoted at 1.73½c to 1.80c; large sizes command all the way from 1.90c to 2.10c.

OLD MATERIAL.—The market is strong and prices on most kinds of scrap are higher. We quote: Old steel rails, $21 to $21.50; miscellaneous heavy steel scrap, $20.50 to $21; low phosphorus scrap, $26.50 to $27.50; old steel axles, $26 to $27; old iron axles, $29 to $30; old iron rails, $24.50 to $25; old car wheels, $23.50 to $24.50; choice scrap railroad No. 1 wrought, $23 to $24; country scrap, $20 to $21; machinery cast, $19.50 to $20.50; No. 2 light scrap (forge), $17.50 to $18; No. 2 light scrap (ordinary), $13.50 to $14.50; wrought turnings, $16 to $16.50; wrought turnings choice heavy, $16.75 to $17.50; cast borings, $10.75 to $11; stove plate, $15 to $16.

ST. LOUIS.

March 3.

PIG IRON.—The market is steady and featureless at last week's prices. Buyers are still reluctant to come into the market for any round lots and the trading is for small lots. The buying season for the second half has not started in and in consequence the furnace agents and jobbers are in a quandary as to what things are going to do and what the requirements for this section will be. The car situation, after months of unprecedented trouble, is clearing up and shipments are coming in faster than for some time. The roads are able to systematize their business in better shape and with the exception of lines to Pittsburg everything is moving nicely. Prices hold the same and if actual sales are to be the criterion the market is based on about $18.75 Birmingham for No. 2 or $22.50 St. Louis for first half delivery. Spot iron is bringing only a little more. The outlook for future prices can hardly be sized up as yet. The coke situation is still troublesome.

Sales are being made every day f. o. b. East St. Louis at $10.25, with a stiffening tendency due to apprehension of labor troubles in West Virginia. We quote f. o. b. East St. Louis (first half):

No. 1 foundry and soft	$23 75 to 24 25
No. 2 foundry and soft	22 75 to 23 75
No. 3 foundry and soft	22 00 to 22 50
Gray forge	20 00 to 21 00

FINISHED MATERIAL.—Jobbers report increasing business in all lines of finished material. Shipments are being accelerated by the rapid movement of freight at East St. Louis, the tonnage for the past week being enormous. Mill prices on bars are quoted at from 1.82 to 1.85. The enormous amount of building contemplated during the summer has made building material quite a scarce article and premiums of $6 to $8 are asked for any sort of delivery. Inquiries for small lots are still coming in rapidly and specifications on old contracts are slow. The contracts for all the World's Fair hotel have already been placed, the leading interest securing the majority of the business. No. 27 gauge sheets are quoted at 3.15 and 27 gal. at 4.00; the sales have been small. There has been no disposition to shade that has been noticeable.

In the tubular business the only cloud is the shortage of cars which are two to five weeks late. Some large contracts will soon be placed for cast pipe.

OLD MATERIAL.—The market is very strong with an upward tendency in prices due to the fact that the yards of many of the local dealers have been cleared up by the demand incident to the late freight blockade. The following prices are for gross tons:

Iron rails	$25 80 to 26 00
Heavy melting steel scrap	19 75 to 20 50
Mixed steel	18 50
Heavy relaying rails	31 00 to 33 00
No. 1 railroad wrought	$21 00
Shafting	22 50
Iron axle turnings	16 50
Cast borings	11 00
No. 1 boilers, cut	15 00
Heavy cast scrap	18 00
Stove plate	13 00
Railroad malleable	16 00
Iron axle turnings	16 00
Busheing scrap	17 50

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM NO 1909, 150 NASSAU ST. March 3.

PIG TIN.—During the past week, the pig tin market was exceedingly strong and prices show an increase of over one cent per pound. As has been the case for weeks past, manipulators alone are responsible for the strength the metal has displayed, there being no trade developments to warrant it. The advance of 20 cents per box in tin plates, announced yesterday, however, had the effect of making closing quotations today the highest of the week. In London the market for the week acted in sympathy with conditions here, and prices attained a considerably higher level. Closing quotations at the Metal Exchange today were as follows: Spot, 30.55c to 30.95c; March to June, 30½c to 30⅞c. London's closings follow: Spot, £139; futures, £139 15s. The pig tin statistics for the month of February, compiled by Secretary Mayer of the Metal Exchange, show arrivals at Atlantic ports to have been 3,275 tons, making the total arrivals since January 1, 1903, 5,820 tons.

COPPER.—Wall Street influences were again active in the metal during the week, and prices are much higher than our last quotations. In trade circles the opinion still prevails that the present upward movement is forced. In London, the market during the week developed great strength, superinduced by the same features as those which obtained here. Today's closings at the Metal Exchange were as follows: Lake and Electrolytic, 13⅜c to 13⅝c; casting, 13⅛c to 13½c; standard, 12⅞c nominal. London's closings follow: Spot, £59 12s 6d; futures, £59 17s 6d. The February monthly statistics in copper, compiled by Secretary D. Mayer of the Metal Exchange, estimate exports for the month to have been 8,685, against 14,000 tons for a similar period last year.

LEAD.—Lots of 50 tons or more sell at 4.12½c. St. Louis is stronger at 4c. London is a shade higher at £12 7s 6d.

SPELTER.—The firm tone of the market continues, but prices are without change at 5.00c to 5.10c. St. Louis is slightly better at 4.90c. London has improved a little and is now £21 15s.

ANTIMONY.—The market is without change, Cookson's being 8½c to 8¾c; Hallett's, 7c; and other brands, 6¾c to 7c.

NICKEL.—Large lots can be had at from 40c to 50c, and smaller lots at from 50c to 60c.

QUICKSILVER.—Jobbers only are in the market, and sales have been made on the basis of $48 per flask in lots of 100 flasks. London, £8 15s.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
519 MONADNOCK BLOCK, March 3.

The market has been very strong in the past week and both copper and pig tin have advanced. Buying has been liberal. We quote Lake copper, carload lots, 14c; smaller quantities 14½c. Pig lead is strong at 4.05c in 50-ton lots, 4.07½ in carloads, and 4.10c in smaller lots. Pig tin is in good demand and is quoted 33c. Spelter is without change, 5c for carload lots, and 5½c for lesser quantities. Sheet zinc, has been fair at 6¼c for lots over 600 pounds. Antimony, 10¾c to 11c for Cookson's, and 9¾c for Hallett's in small quantities. Old metal has been in good demand, the following quotations ruling: Copper wire, $11; heavy copper, $10.75; light copper, $9.75; red brass, $10.75; yellow brass, $8; light brass, $6.75; lead pipe, 3½c; zinc, 3c.

Marinette Iron Works Mfg. Co., Marinette, Wis., is so crowded with work that it has become necessary to operate its plant day and night to keep pace with the business coming in. It has more unfilled orders on its books than at any time in the past three years. The company has largely increased its plant in the past year and a half, but further extensions have been decided upon. At a special meeting of the stockholders held last month, it was voted to increase the capital stock from $200,000 to $400,000, for the purpose of installing new and modern tools and increasing the working capital. Sales last year showed an increase of 100 percent over those of the year previous, and the company expect the business of 1903 to show a still greater increase. The following are some of the orders recently received: One 60-h. p. three-cylinder gas engine for the West Penna Foundry & Machine Co., Avonmore, Pa.; one 75-h. p. three-cylinder engine, University of Wisconsin, Madison, Wis.; six 75-h. p. three-cylinder engines, direct connected to generators, for the Diamond Lighting Plant, Pittsburg, Pa.; three 75-h. p. three-cylinder engines, direct connected to generators, for the Pittsburg Post Publishing Co., Pittsburg, Pa.; one 75-h. p. three-cylinder engine, direct connected to generator, for F. Schenek & Sons Co., Wheeling, W. Va.; two 30-h. p. three-cylinder engines, direct connected to generators, for Ringling Bros.' circus, Baraboo, Wis.; two 25-h. p. two-cylinder direct connected engines, for the Keystone Engineering Co.; one 100-h. p. three-cylinder engine for the town of Knightstown, Ind., and one 90-h. p. three-cylinder engine for the Keystone Engineering Co., Pittsburg, Pa.

The Winchester Repeating Arms Co. has recently increased the capacity of its gas power plant at New Haven by the purchase of two 165-h. p. Westinghouse three-cylinder producer gas engines. The present equipment comprises about 500-h. p. Westinghouse gas engine generator units, and Loomis-Pettibone producers. The plant supplies electric power and light for operating the entire manufacturing establishment. The order was secured by Westinghouse, Church, Kerr & Co.

The directors of the New Haven Locomotive Co. have elected Walter Camp president to succeed Samuel A. Galpin, who died last summer. George E. Stevens, of New York, was elected vice president and assistant treasurer to succeed Mr. Camp, and Frank Stevens, of New York, was chosen secretary. E. P. Root was chosen to the Board of Directors to succeed Mr. Galpin. Mr. Root has been superintendent of the motive power department for years. The executive committee consists of Henry F. English, chairman, Pierce N. Welch and George E. Stevens.

New Capacity of the Steel Corporation.

(Special Telegram.)

PITTSBURG, March 4.—Of the $36,000,000 appropriated for improvements by the United States Steel Corporation, the National Tube Co. has received more than 50 percent, or $18,234,158. This exceedingly large appropriation for one company has not been made on account of the deterioration of its plants, but to provide facilities for handling the enormously increased demand for the product of this company. The finishing capacity is to be increased nearly 50 percent, or from 900,000 tons annually to 1,300,000 tons. A number of the company's isolated plants will be dismantled as soon as the proposed improvements are entirely completed, as the cost of operating some of these plants on account of their location is out of proportion to the cost of production at favorably located plants.

The National Tube Co. at present has five blast furnaces in operation, and with the three additional stacks provided for, the pig iron output will be increased from 605,000 tons to 1,118,000 tons annually.

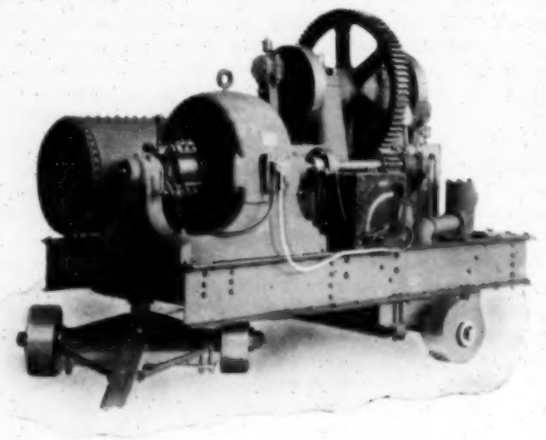
On account of the absorption of the Sharon and Union steel companies the additional blast furnace and rolling capacity of the Carnegie Steel and National Steel companies was not increased to the extent at first calculated upon. The improvement program before the absorption of these properties provided for the erection of two new stacks at the Duquesne, Pa., plants in addition to the new stacks already erected at the Edgar Thomson plant and the one under erection at the Carrie plant. In the National Steel Co.'s appropriation the cost of the new stack at Youngstown, O., recently announced, is provided for and the rebuilding of one stack at New Castle, Pa. The original program provided for the rebuilding of practically all of the stacks of this company at New Castle, Pa.

Inasmuch as the output of the mills of the American Tin Plate Co. and the American Sheet Steel Co. is already sufficiently large to take care of the domestic consumption of tin plate and black sheets respectively, the appropriation provided for new construction for these companies is comparatively small. The improvements to be made to the mills of the American Sheet Steel Co. are the same as have been announced heretofore. The appropriation for the Isabella furnaces of the American Steel Hoop Co. covers the work now going on at these stacks, while a new angle mill is provided for to be erected at the Upper Union mills at Youngstown, O. The latter has not heretofore been announced.

The enormous increase in pig iron producing capacity provided for is not any more than sufficiently large to provide raw material for the finishing mills. In this connection it is interesting to note to what extent the pig iron capacity of the United States Steel Corporation has been increased during the past six months and the further increase involved in the building of the new stacks provided for and those now under erection. The National Tube Co. several months ago blew in a new stack at Wheeling, W. Va., with an annual output of 175,000 tons. The Carnegie Steel Co. added two stacks to its Edgar Thomson plant, with an annual output of 350,000 tons, while a third stack is under erection at its Carrie plant, with an annual output of 175,000 tons. The reconstruction of the two Isabella stacks of the American Steel Hoop Co. added 100,000 tons annually, while the three new stacks of the National Tube Co. will provide for an additional 513,000 tons. The new National Steel Co. stacks at Youngstown, O., will have an annual output of 200,000 tons, while the new stacks of the Sharon and Union steel companies will have a capacity of 700,000 tons. In addition the present stack at Sharon, Pa., has a capacity of 150,000 tons a year. The remodeling of furnaces at Joliet, Ill., and the rebuilding of stacks at Edgar Thomson and Duquesne will no doubt still further add 100,000 tons to the capacity. Inasmuch as the stacks provided for cannot be completed before early 1904, the figures show that in the 18 months beginning with July, 1902, the pig iron producing capacity will have been increased nearly 2,500,000 tons. All the steel works of the corporation are suffering on account of a shortage of pig iron at the present time.

RAND PORTABLE AIR COMPRESSOR.

The illustration below presents a new design of portable air compressor built for the Jones & Laughlin Steel Co., of Pittsburg, by the Rand Drill Co. The air compressor has two 12x12 vertical single acting plunger cylinders water jacketed and has a capacity of 275 cubic feet of free air per minute, the air pressure being 100 to 110 pounds. It is driven by a 50-h. p. Westinghouse motor, direct current, 220 volts, with starting rheostat, a rawhide pinion on the motor shaft meshing with the cut gear of the compressor. The air receiver is 28 inches diameter by 8 feet in length. The outfit is mounted compactly on a wrought iron frame with heavy axles, wheels



and shaft for moving it with horses from place to place. The Rand Drill Co. (Pittsburg agency, 710 Park building) makes this design in sizes from 16 cubic feet to 320 cubic feet free air per minute.

Advance in Tin Plate.

(Special Telegram.)

PITTSBURG, March 4.—The American Tin Plate Co. has made a general advance of 20 cents a box in the price of tin plate. For 100-pound coke plates the new price is $3.80 instead of $3.60. The reason given for the advance is the higher prices for pig tin and fuel.

The Mackie Steel Tube Mfg. Co., Hammond, Ind., and the Clifton Mfg. Co., Boston and Buffalo, have been consolidated. These companies manufacture conduit tubing. The Mackie company will triple its working capacity both as to men and machinery and will be the main manufacturing point for the new corporation.

The Stilwell-Bierce & Smith-Vaile Co., of Dayton, O., has lately secured a contract for a complete water works for installation in Ponce Porto Rico. The contract, which is valued at some $63,000 includes two compound pumping engines having a combined capacity of 5,000,000 gallons, 400 tons of cast iron water pipe, varying from six inches to fourteen inches in diameter, and a 450-horsepower boiler plant.

The East India Iron & Steel Syndicate, Ltd., whose head offices are in the Albert Mansions, Westminister, London, S. W., is to construct large works in the vicinity of Bisva, on the Bengal-Nagpin Railway.

The American Car & Foundry Co., has received an order for cabooses, to be shipped to Peru for use on the Cerro de Pasco Railway, which is being built by American capitalists.

Several large machine tools, steam hammers, lathes, etc., will be utilized in connection with the proposed new docks, which are to be built by the New South Wales Government at New Castle. New Government workshops are about to be erected at New Castle. The initial cost of construction and equipment is put at $250,000.

THE IRON TRADE REVIEW

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HEAVY IRON AND STEEL IMPORTS CONTINUE.

The report of imports and exports published by the treasury department shows that the imports of pig iron for January of this year were 110,679 tons, which is higher than those of any month save December of last year, when they were 118,373. The imports of steel were greater than for any month of last year except August, the imports for January, 1903, being 38,691 tons against 5,309 in January, 1902, 39,027 last August, and 23,733 last December. Comparing January of this year with January of last year, the heavy increase in imports of scrap, bar iron and rails is noteworthy. The total imports for the seven months ending with January are within 110,000 of the imports for the entire year 1902. The following table gives in detail the imports for January and for the seven months ending with January:

IMPORTS OF IRON AND STEEL TO THE UNITED STATES—GROSS TONS.

	Seven months ending January			
	1902	1903	1902	1903
Pig iron	7,883	110,679	51,237	620,455
Scrap	3,284	12,803	16,526	86,367
Bar iron	1,364	7,277	14,979	27,812
Iron and steel rails	449	5,405	1,744	55,205
Hoop, band or scroll	743	49	3,510	944
Steel ingots, slabs, billets or bars	5,309	38,691	9,664	241,937
Sheets and plates	481	1,774	4,874	5,302
Tin and terne plates	7,058	5,298	59,370	28,888
Wire rods	1,365	1,888	9,749	14,473
Wire and wire articles	290	237	2,597	1,787
Total	28,226	184,101	174,250	1,083,170

The total value of iran and steel imports for January, not including ore, was $4,948,417 against $1,950,645 in January, 1902. In the seven months, the totals were $31,245,980 in 1903 and $13,959,629 in 1902. Iron ore imports in January were 148,219 tons against 118,159 in January, 1902. In the seven months, the total imports of ore were: 1903, 651,450 tons; 1902, 671,858 tons.

Exports for January were only 17,455 tons as compared with 42,811 tons in January, 1902. The losses are on nearly all articles while gains are not important. For the month the value of imports was $8,088,958 in 1902 and $7,437,298 in 1903. The values given for both imports and exports include numerous manufactured articles not named in these tables. The following table gives the exports for the articles named:

EXPORTS OF IRON AND STEEL FROM THE UNITED STATES—GROSS TONS.

	Seven months ending January			
	1902	1903	1902	1903
Pig iron	7,233	1,431	45,191	12,172
Scrap	636	136	8,458	2,923
Bar iron	2,224	278	6,169	6,391
Wire rods	215	460	5,370	17,974
Steel bars (not wire rods)	1,545	2,121	11,849	6,145
Iron rails	132	10	596	45
Steel rods	14,386	454	132,539	19,246
Billets, ingots and blooms	276	37	2,249	1,512
Hoop, band and scroll iron	424	144	1,025	679
Iron sheets and plates	348	139	2,817	1,790
Steel sheets and plates	616	471	5,437	7,434
Tin plates, terne plates and taggers' tin	141	104	181	635
Structural material	4,972	2,699	29,295	19,691
Wire	7,225	6,414	54,972	52,363
Cut nails	760	517	3,572	3,680
Wire nail	1,525	1,707	9,952	15,992
Other nails including tacks	153	183	1,091	1,531
Total	42,811	17,455	320,702	171,203

IMMENSITY OF THE LAKE ORE PILE OF 1902.

The size of the ore pile mined in the Lake Superior region last year can best be appreciated by a comparison with the dimensions of well known structures. The total shipments were 27,571,210 gross tons, or approximately 275,711,210 cubic feet. The height of the Washington monument is 555 feet and the length of Westminster Palace is 885 feet. If we imagine a structure as high as the monument, as long as the palace and 561 feet wide, we would have a building containing the number of cubic feet in the Lake Superior ore pile of 1902 before it was mined, if it had all been in one place. The hole made in the ground by the year's mining would be 275 feet deep, 1,000 feet wide and 1,000 feet long. Into this hole, 53 buildings of the size of the Frick Building in Pittsburg could be placed.

Deere & Co., manufacturers of plows at Moline, Ill., have issued $1,500,000 5 percent gold debenture bonds redeemable on interest days at 105 and interest. The circular issued by the firm which is receiving applications for the bonds states that Deere & Co.'s average net earnings for the last five fiscal years have been $640,918.27, that the only liabilities consist of current accounts not yet due, $392,333, and this issue of bonds, and that since 1868, not less than 10 percent annual dividend has been paid to stockholders.

The name of the Christensen Engineering Co., Milwaukee, should be added to the list of steel foundries in the United States, as published in our last issue. Crucible steel castings are made, almost entirely for the company's own use, the annual capacity being 2,000 tons.

Referring to the record of 7,728 rivets driven in 10 hours as mentioned in this paper last week, John F. Allen, of New York, manufacturer of portable pneumatic riveting machines, calls attention to repeated performances at the plant of Milliken Bros., Brooklyn, N. Y., where 175 rivets have been driven in five minutes, or 35 a minute. He also cites the performance of men under Geo. H. Austin, foreman of the Lassig Bridge & Iron Works, Chicago, in which 10,919 rivets were driven in 10 hours. In both instances the work was done with Allen machines.

The Dunbar Furnace Co., Dunbar, Pa., has installed silica rock crushing capacity that will produce 800 tons of silica sand per day, making this one of the largest plants of its kind in the country. The sand is now being offered for use in open-hearth steel furnaces, steel casting plants, locomotives, air furnaces in malleable iron works, rolling mills, fire brick works, and for cores for iron and steel castings. The company's offices are located at Pittsburg and Philadelphia, Pa.

The National Injector Co. has recently removed its plant from Cleveland to Geneva, O., where it has purchased the plant of the Knapp & Pratt Mfg. Co.

A Revision of H. H. Campbell's Work on Steel.

THE MANUFACTURE AND PROPERTIES OF IRON AND STEEL. By Harry Huse Campbell, general manager of the Pennsylvania Steel Co. 8vo. 862 pages. New York: Engineering and Mining Journal. Price $5. Sold also by the Iron & Steel Press Co., Cleveland.

Mr. Campbell's earlier work, published in 1896, of which the book before us is a revision—and to a large extent a rewriting—appeared under the title, "The Manufacture and Properties of Structural Steel." It contained 397 pages, or 465 less than the new work. As rewritten the earlier work constitutes Part II of the new one, consisting of 563 pages under the sub-title "The Metallurgy of Iron and Steel." Part I is an introduction consisting of 33 pages, in which the author presents what he terms, "The Main Principles of Iron Metallurgy." It is a condensed statement stripped of technical terminology, of the processes of making pig iron and the various kinds of steel. An example of the method of treatment, for the benefit, as the author explains, of those not metallurgists, is found in the following extract from the three pages on pig iron:

"As the air is red hot when it enters the tuyeres, and as it immediately meets glowing coke which has been heated by its downward passage through the furnace, it follows that a very high temperature must be caused at this point. This region, therefore, immediately about the tuyeres is called the 'zone of fusion.' It is here that the real melting occurs, but a great deal of the work is done higher up in the furnace, for the gases from this hot zone of fusion ascend through the overlying 70 or 80 feet of stock and heat it to a high temperature, and under these conditions there is a reaction between the carbon of the gas and the iron ore, whereby the oxygen of the ore unites with the carbon and leaves the iron in the finely divided metallic state known as 'spongy iron.' The reaction is not complete and a great deal of ore reaches the zone of fusion in a nearly raw state, but in this zone the extremely high temperature quickly completes all reactions; the raw ore is rapidly reduced, the earthy impurities unite with the limestone and are fused into slag, while the metallic iron melts and is collected in the hearth below the tuyeres."

Part II, which makes up the bulk of the book, presents much of the results of the author's extended experience and the work of the laboratory staff at the Steelton works. It is given up to the live problems of the latter-day metallurgy of steel. Some of the chapter titles will indicate the ground traversed—"The Blast Furnace," "Wrought Iron," "Steel," "Acid Bessemer Process," "Basic Bessemer Process," "The Open-Hearth Furnace," "Fuel," "The Basic Open-Hearth Process," "Segregation and Homogeneity," "Heat Treatment," "History and Shape of the Test Piece," "Influence of Certain Elements on the Physical Properties of Steel," "Classification of Steel," "Welding," "Steel Castings." The chapter on the blast furnace and that on fuel have been much expanded from their original form, to embody the results of recent practice. The author, while abroad in 1899, investigated the use of blast furnace gases in gas engines, visiting every gas engine in Europe that was driven by furnace gases. His conclusions were: that there was not a thoroughly satisfactory installation in existence; that some engines were structurally weak, while others would be easily deranged by dust; that no method then in use washed the gas satisfactorily. Yet he then conceded that simple and strong engines could be made, that a way would be found to wash the gas, and that then gas engines would come to stay. Mr. Campbell operated a gas engine at Steelton for some months in 1900, but the dust caused troubles, which he grants a different type of construction might have obviated. The second blast furnace gas engine operated in the United States is one of small size at the Maryland Steel Co.'s furnaces, satisfactory results being obtained. When the large Körting engines the Lackawanna Steel Co. is installing at West Seneca, N. Y., have been operated for a time further light will be thrown on the subject. Mr. Campbell finds compensation for the backwardness of American blast furnace engineers in respect to the gas engine in the fact that Europe has experimented at high cost. "Up to the present time," he sums up, "a thoroughly well built gas engine, with its scrubbers, its reserve units, and reserve producers, has cost so much more than a steam engine, that the fuel saved would no more than pay the interest and depreciation on the extra investment."

The chapter on blast furnaces treats, in passing, of the relation between the physical and chemical qualities of cast iron. Mr. Campbell finds no great value in much of the investigations into the mysteries of cast iron, since "most of the deductions have been made without complete data and by men who did not know that the data were incomplete." In general he follows Prof. Howe in arguing that from one point of view steel is a grade of cast iron and cast iron a grade of steel. "After subtracting the graphite from our calculation the remaining carbon and iron form a matrix which may be assumed to follow the laws that hold good for all the grades that are usually known as steel." Citing the superiority of charcoal cast iron and the better quality of product obtained from iron melted in air furnaces, Mr. Campbell says that so long as these and many other kindred phenomena are not explained, foundrymen are not to be blamed for clinging to some of their traditions.

Another question which arrests attention in a cursory examination of the book, is discussed in the chapter on methods of manufacturing steel as affecting the cost. The necessity of working a large proportion of pig iron, which open-hearth steel manufacturers are being driven to face, introduces a very interesting presentation of the Talbot and Bertrand-Thiel processes and the methods in vogue where direct metal is used in the open-hearth furnace. The tilting furnace, rotating about a central axis, as at Steelton, has been effective in overcoming the objection to an entire charge of pig iron due to the violent ebullition; the furnace being tipped over until the metal is thrown away from the doors, and kept thus until the bath has quieted down. The results under the Talbot process Mr. Campbell does not comment upon with enthusiasm, affirming that more than one works is now operating furnaces of less capacity (than 75 tons, as cited in Mr. Talbot's original paper), and making fully as much or more (than 2,100 gross tons per month) on all-pig heats. "Thus I find a time in 1896 when we were running 97.5 percent of cold pig iron in a 50-ton furnace and the output was 437 tons in one week, which is at the rate of 1,894 tons per month." The author affirms that the use of direct metal is not new; that while it is advantageous to a certain extent it does not save as much time as might be expected. "In the same way it will not do to lay much stress on the gain in weight from the iron ore which is brought forward so prominently by Mr. Talbot. It is a mistake to regard this as in any way characteristic of the method."

Space is not available for a proper characterization of that portion of Mr. Campbell's book, Part III, in which he surveys "The Iron Industry of the Leading Nations." When the report of the British Iron Trade Commission on conditions and progress in the American iron trade appeared last year, the reader was surprised at the amount of material the visitors had gathered dealing with vital factors in the "American supremacy" in steel-making. The comment was made in these columns that it was a pity to have left to representatives of a rival nation in iron manufacture the preparation of a volume containing more than any single publication had ever given concerning the characteristic features of American iron and steel works practice. But it has remained for Mr. Campbell to present such a picture of the economic side of iron making today in the leading nations as had not been attempted. His study of conditions in the United States presents for the first time in permanent form the advantages of the various districts, in proximity to raw materials and markets, and indicates the part each has had in bringing the tonnage of the United States to such magnificent proportions. There have been papers before our engineering societies dealing with the question of the most economical situs of iron and steel manufacture in the United States, and from time to time the relative advantages of the different centers have been discussed in technical and trade journals. Much of such writing has been specially in the interest of particular districts. Mr. Campbell is generally fair in his statements and conservative in all. Of the Lake Erie situs he says that the mathematics of the assembling proposition are clear enough, and he admits, as events establish, that the trend of new enterprises is toward this district, but does not concede that a Lake Erie position enlarges the sphere

of commercial influence as much as might be expected. It may be said in passing that time may be counted on to bring new transportation advantages bearing out some of Mr. Carnegie's optimistic prophecies. One of Mr. Campbell's special qualifications for the work represented in his book appears in this particular chapter. Though a man of books and records he is first of all a man of facts and known results. He has evidently seen too much of steel making as it is to exercise the penchant of our English visitors for figuring out on paper the costs of the different districts. Paper costs are not an inviting field to a man who for years has made steel for the market and knows too well what competitors are actually doing to feel much interest in the theory and mathematics of costs that have a mere paper existence.

In the presentation of his statistics of pig iron and steel production Mr. Campbell has made a new and in many respects desirable arrangement of producing territory. He groups together the Pittsburg district as generally understood, the Wheeling district (extending on both sides of the Ohio), and the Shenango and Mahoning Valleys, and calls all together the Pittsburg district. Cleveland (with Lorain) is separated from the remainder of Ohio. A number of changes are made also in Pennsylvania, Johnstown being put by itself, also Steelton. For the rest of Pennsylvania there are two divisions—Lehigh Valley and Southeastern Pennsylvania. There are difficulties in the new classification, as well as in that of the American Iron and Steel Association. Buffalo, for example, with its vast new development and its increasing importance as a pig iron producer in recent years, belongs more appropriately to the Lake Erie district than to New Jersey and New England, to which Mr. Campbell attaches it with the rest of New York State. Some excellent maps of the various steel producing districts, the coal and coke fields of the country and of the Lake Superior ranges are given in this part of the book. The treatment of the fuel resources that have contributed so greatly to our iron and steel development is probably more complete and satisfactory than that of the unmatched ore supplies of the Lake Superior region.

The chapters on the iron and steel producing districts of the old world, with their maps and statistical data, are an admirable setting forth in small compass of the performance and possibilities of our rivals in other lands. Germany and England (with emphasis on the former) are the two competitors to be looked to. Mr. Campbell has drawn freely upon others for the material of his foreign section, much of his information on English and German conditions being credited to the excellent monograph of Mr. C. Kirchhoff.

In the introduction to Part III the author treats generally of the factors in industrial competition under the heads of management, the question of employer and employed, and tariffs. Proper stress is laid on the first, some plain truth is uttered under the labor head, and in his treatment of the tariff the author is more student and engineer, than captain of industry. Some of the considerations urged in this chapter are familiar. The author is cool and calculating in his estimate of American achievement; not quick to throw up his hat over the work of the few who have been rather conspicuously credited with much of our advance; and quite mindful of the strong points in foreign methods. One will carry from his reading of the whole book a good opinion of the work of American metallurgists in iron and steel, and may feel, perhaps, that the part of the mechanical engineer in our latter-day advance is not emphasized as it has been in some quarters.

It is a prodigious achievement—to have produced a work like this in the thick of such every-day tasks as have fallen to American steel works managers in the past five years. One marvels at it, and is prompted to express the debt the iron trade of the country owes Mr. Campbell for doing so well something that has long waited to be done. Not many American steel works engineers and managers have any taste for making literature, probably not another one. The elements of metallurgical engineer, manager and author are rarely mixed. But the American iron trade is to be congratulated on the combination as it exists in Mr. Campbell; for he has certainly given it a monumental work.

The International & Great Northern R. R. Co. has nearly completed the erection of its shops at Mart, Texas. All of the machinery has been ordered and most of it received.

PITTSBURG FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Pittsburg Foundrymen's Association was held at the rooms of the Engineers' Society of Western Pennsylvania, Pittsburg, Pa., on Monday evening, March 2. George C. Hicks, chief engineer of the P. H. & F. M. Roots Co., of Connersville, Ind., presented a paper on "Rotary Blowers," which appears elsewhere in this issue, while the overhead tramrail system of J. W. Moyer & Co., of Philadelphia, was described in an able paper by A. W. Moyer and illustrated with stereopticon views. The J. D. Smith Foundry Supply Co., of Cleveland, and the Charles G. Smith Co., dealer in machine tools, of Pittsburg, were admitted to membership. The following were present:

Wm. Yagle, Wm. Yagle & Co.
Mr. Litchfield, J. W. Moyer & Co., Philadelphia, Pa.
C. W. Townsend, Thos. Carlin Sons Co.
W. H. Nichols, Seaman-Sleeth Co.
Jno. F. Birch, Pittsburg Malleable Co.
C. W. Winder, Westinghouse Electric & Mfg. Co.
John Schick, Westinghouse Air Brake Co.
W. J. Reardon, Westinghouse Electric & Mfg. Co.
W. J. Dorsey, Enterprise Foundry Co.
J. A. Bowman, Jones & Laughlin Steel Co.
L. E. Dunlap, Mackintosh-Hemphill & Co.
W. J. Naeser, Wm. Yagle & Co.
Mr. Schade, Braddock Machine & Mfg. Co.
James Sloss, Braddock Machine & Mfg. Co.
S. D. Sleeth, Westinghouse Air Brake Co.
J. Hunter Sleeth, Westinghouse Air Brake Co.
F. E. Malone, J. S. McCormick Co.
D. J. Thomas, Sterritt-Thomas Foundry Co.
S. H. Stupakoff.
T. S. Beeson, Fort Pitt Malleable Co.
A. Rosenburg, S. Obermayer Co.
C. B. Carlisle, Eagle Foundry & Machine Co.
E. D. Frohman, S. Obermayer Co.
J. B. Coates, Pittsburg Malleable Co.
R. W. Beers, Sterritt-Thomas Foundry Co.
Mr. Phillips, Phillips & McLaren.
S. W. Hay, Whiting Foundry Equipment Co.
S. F. Warren, Pennsylvania Malleable Co.
A. O. Backert, *The Iron Trade Review.*
Charles G. Smith, Chas. G. Smith Co.
Geo. C. Hicks, P. H. & F. M. Roots Co.
George Phillip Maury, Metallurgical Laboratory.
B. D. Fuller, Westinghouse Electric & Mfg. Co.
C. Jones, Rosedale Foundry Co.
J. S. Seaman, Seaman Sleeth Co.
J. Lane, Keystone Car Wheel Co.
F. H. Zimmers, Union Foundry & Machine Co.

Memorial to Abram S. Hewitt.

A movement has been started in New York to endow Cooper Union as a memorial to the late Abram S. Hewitt. The committee appointed to receive subscriptions to the fund is composed of William E. Dodge, Andrew Carnegie, J. Pierpont Morgan, Morris K. Jesup, R. F. Cutting, Jacob H. Schiff, R. T. Wilson, John E. Parsons, William C. Whitney, D. Ogden Mills, Wheeler H. Peckham and Charles A. Schieren. It is expected that $500,000 will be raised. The first subscriptions received were the following: Andrew Carnegie, $50,000; J. Pierpont Morgan, $25,000; William Earl Dodge, $25,000. Subscription papers circulated contain a glowing tribute to Mr. Hewitt:

"His life was largely devoted to work for his fellow citizens, notably for those who labor, and especially in their case in connection with the steel and iron industry, with which he himself was identified during all his business career. His death makes it fitting that those who survive and recognize the value of such service shall, in a measure, take up his work. From its inception he gave to the Cooper Union time, effort, generously of his means, and an untiring interest which continued unabated to the last. It had the benefit of his wonderful talent, his great ability, and of a fund of accurate information which was almost inexhaustible."

At a recent meeting of the directors of the Seamless Steel Tube Co., of Detroit, W. C. McMillan was elected president; T. H. Simpson, vice president; Geo. M. Black, secretary and treasurer; R. H. Phillips, assistant secretary; C. H. Wood, manager.

C. C. Murray will be connected with the Railway Appliances Co. with headquarters at Pittsburg, giving his time more particularly to the sale of the Q. and C. pneumatic tools.

Philadelphia Machinery Market.

March 3.

February was a remarkable month in many respects. Ordinarily a large amount of business is not looked for in the second month of the year. A general unsettling, as a result of January inventories, is the usual thing, and changes in firms and corporations have their effect upon the machinery trade. The month just closed was not an exception to this condition, but the course of business was peculiar. A smaller number of large orders, and a larger number of small orders, with inquiry greater than it has been for some time, were the three chief features of the market. An additional feature perhaps was the unusually low tonnage of shipments. Each of these conditions is accounted for. The absence of large transactions was due to the season, and was expected. The large influx of small orders is a result of the round up of dealers' stocks during the inventory season. Little gaps here and there in general stocks have been covered and the inroads of the past few months have been met. This business has offset the deficiency in the larger kind, so that in the aggregate the volume of business was fully as large as that for January.

The number of inquiries in the market just now is simply astonishing. A prominent machine tool builder said today that if he should secure orders to the extent of 10 percent of the quotations he had made during last month it would mean that he would have work enough to run his whole plant for a year. With all this inquiry, however, there is an undertone which detracts very much from the rosiness of the outlook. Machinery builders are showing a tendency to restrict their quotations. Prices on anything large must be accepted or declined within a set period, and are only applicable to deliveries in the near future, six months being about the limit. This is due to a nervousness very generally felt in regard to the labor question. There are signs that trouble may be expected before many months have passed, and the tool builders do not wish to be caught with large contracts on hand. The outcome of the recent commission on the coal miners' strike is awaited with keen interest, as having an important bearing on the labor question in all its phases.

There is still much difficulty in getting raw materials, and much work is delayed in consequence. It is not alone the producers' shortcomings that are a drawback, but the railroads are making very slow deliveries, due, it is explained, to the congested state of the traffic on the different roads.

The long talked of plant for the Whitney Car Wheel Co. seems about to materialize. Plans have been prepared by the company's architects, Milligan & Webber, of Philadelphia, for a plant to cost about $100,000, to be erected between Eleventh and Twelfth Streets, and Chelten Avenue and the Pennsylvania railroad, South Camden, N. J. The plant is to consist of a large one-story wheel foundry, 176x98 ft., 40 ft. high, of steel construction; an engine and boiler house one story high, 56x56 feet, with a stack 125 feet high; a machine and pattern shop, 50x85 feet. A one-story office, 53x20 feet, is also to be built, and adjoining it will be a chemical laboratory, octagonal in shape, with a 20-ft. radius. The plans are now in the hands of builders for estimates.

Two or three rumors are afloat concerning the establishment of new steel foundries on the Delaware river front. It is believed that an option on a large tract of land adjoining the plant of the Gruson Iron Works at Eddystone has been obtained for foundry purposes by Philadelphia parties; and it is announced that a charter has been applied for to incorporate a new steel casting concern having as its chief promoter Frederick Baldt of the Penn Steel Casting & Machine Co., Chester, Pa.

The O'Malley Mfg. Co., of Scranton, has been in the market the past week, and has left many orders for the equipment of its new plant in Scranton. The company has erected a building of good size and is equipping it for the manufacture of plumbers' and steam fitters' supplies.

The Newton Machine Tool Works have commenced operations on the extensions to their plant, and hope to occupy it before the middle of June. Almost all of their additional equipment has been purchased. They will install Shaw electric cranes. They have an immense amount of business in their shops, and are preparing to make some heavy shipments this month. February was an excellent month with them, as far as orders are concerned, but their shipments were light.

The Hess Machine Works are quite busy, and made some good shipments recently to Russia, Germany, France and England, covering outfits of file making machinery.

The Wilbraham Green Blower Co., maker of rotary pressure blowers and exhausters, has plenty of work in hand, some of it very large in character. The company has just issued a new catalogue covering the different types of blowers it manufactures.

At the Bourse, the occupants of Machinery Hall report a fair business for the month. The stock of machine tools on the floor does not appear to have so many gaps in it as it has had of late. Some very large tools have recently been added, which make the exhibits quite interesting to buyers. Among the newcomers to the department are J. H. Day & Co., Cincinnati, O., R. M. Temple, agent; builders of bakers', paint, and laboratory machinery.

The Falkenau-Sinclair Machine Co. had an excellent business during February in point of orders booked. Among shipments are mentioned a Moore wire tester to the American Steel & Wire Co.; a 200-ton hydraulic press to local parties; and a press of large size to a concern in Boston. The bulk of the shipments for the month comprised standard machines and tools.

The Tabor Mfg. Co. booked a good many orders during February, and made some nice shipments. Mention is made of orders from the American Locomotive Co., Richmond, Va., for an 18x26 split pattern molding machine; Goulds Mfg. Co., Seneca Falls, N. Y., a 16x26 split pattern molding machine; Kennedy Valve Mfg. Co., New York, a 14x16 split pattern machine; H. J. Porter, Pittsburg, Pa., a 14x16 split pattern machine; W. G. Rowell, Bridgeport, Conn., a 7-inch power rammer, duplicate of one already supplied; McRae & Roberts, Detroit, Mich., a 13x18 split pattern machine and a 7-inch power rammer; Neptune Meter Co., Long Island City, a 7-inch power rammer; Standard Steel Works, Burnham, Pa., a 13x18 split pattern machine, and a 7-inch power rammer, and a 13x20 split pattern machine to England.

The Hale & Kilburn Mfg. Co., manufacturers of fine furniture, car seats, and other specialties, is commencing building operations on a new plan at Eighteenth street and Glenwood avenue. The building permits call for a U-shaped four-story factory, to measure 103x173x260x276x70x70 feet; a one story machine shop, 204x70 feet, and a one story boiler house and engine room, 181x32 feet. A portion only of the additional equipment required has been contracted for.

I. H. Johnson, Jr., & Co., lathe builders, report a satisfactory business for February. Shipments were small in the aggregate, but they have a great deal of work approaching completion. Among their shipments were a 48-inch by 18-foot lathe to the Alexander Iron Works, Syracuse, N. Y.; 2 36-inch lathes to Pittsburg parties; and a 30-inch lathe, 47-foot bed, with 8½-inch hollow spindle, to Hilles & Jones, Wilmington, Del., for making plate planer screws.

Thos. H. Dallett & Co. continue busy at their plant, and are making considerable headway with their line of portable electric tools. Their new line of pneumatic foundry and shipyard tools is taking well with the trade, and their business in this direction is increasing.

A reprint of the paper read by Charles Day, of the firm of Dodge & Day, of Philadelphia, before the New York Electrical Society, Dec. 17, on "Requirements of Machine Tool Operation with Special Reference to the Motor Drive," will be sent postpaid on application to R. D. Lillibridge, 170 Broadway, New York.

The American Engineering Works, Chicago, have been put into the hands of a receiver by dissenting stockholders. The Equitable Trust Co., of Chicago, will act as trustee. The liabilities are $118,000 and the assets are said to be $224,000.

The Union Furnace Co., Buffalo, has elected the following directors: Daniel R. Hanna, C. C. Bolton, Frank B. Richards, Frank B. Baird, Henry J. Pierce, and Herbert P. Bissell.

Improvement Plans of the United States Steel Corporation.

The long expected official announcement of the plans of the United States Steel Corporation for additions and improvements, which had been delayed by the litigation over the proposed bond conversion, was made Tuesday by the board of directors in the form of a circular to be sent to stockholders. Judge Gary announced that the new construction, intended to harmonize, extend and round out the various plants, will be pushed forward with all possible dispatch. The plan provides for the issuance of $250,000,000 of 5 percent bonds, $200,000,000 of which are to be exchanged for $200,000,000 of 7 percent preferred stock. The presidents of the constituent companies, who have been in New York this week, have approved the proposed additions and improvements to plants to cost more than $36,000,000. It is estimated that when these expenditures are completed there will be added to the total capacity of the various subsidiary companies 2,700,000 tons of all products.

Judge Gary's statement says it is estimated "that under normal conditions the increased earnings from these increased and improved capacity will be about $7,000,000 a year and that there will be a saving in manufacture of about $5,000,000 a year, or a total of something like $12,000,000 a year added to the profits of the several subsidiary companies." The estimates in detail are as follows:

Illinois Steel Co., at South Chicago, Ill.—The construction of new open-hearth furnace plant, blooming mill and finishing mill, $3,000,000; remodeling the 132-inch plate mill train, $650,000; additional heating capacity at the rail mill, $200,000; improvement of the Bessemer department, $150,000; new blast furnace blowing engines, $475,000; for repairing stoves at Furnaces Nos. 1 to 4, $400,000; addition to machine shop and foundry of $200,000.

Illinois Steel Co., at Joliet, Ill.—Remodeling blast furnaces Nos. 1 and 2, $900,000; addition to converting mill, $150,000; in addition to the foregoing sundry improvements of lesser magnitude have been authorized at South Chicago and Joliet at an estimated expenditure of $420,000.

National Tube Co., at McKeesport, Pa.—The entire rebuilding of the present rolling mills and tube and pipe mills, together with the addition of one new blast furnace, an additional Bessemer converter and the installation of a new water and power plant, all at an estimated cost of $9,255,662. This improvement will increase the production at this plant of pig iron 166,000 tons per annum, Bessemer ingots 140,000 tons per annum, of the rolling mills 124,000 tons, and of the tube and pipe mills 100,000 tons. The increased earnings which will result from the additional capacity, it is estimated, will be $1,553,000 per annum and that a saving will be effected, in cost of production, of $1,805,000 per annum.

At Lorain, O.—The erection of two additional blast furnaces with accessory works, additional rolling mills and a new tube and pipe mill; all at an estimated cost of $8,646,096. These improvements will increase the annual production of pig iron 347,000 tons, of rolling mills 330,000 tons, and of the tube and pipe mills 300,000 tons. The increase due to additional production, it is estimated, will be $1,809,000, while the saving in cost of producing pipe, as compared with the production of an equivalent tonnage at other mills of the National Tube Co. which will be displaced by this improvement, will be equal to $1,500,000, a total gain in earnings of $3,309,000.

In addition to the foregoing, appropriations were authorized for the National Tube Co. for sundry improvements at its Pennsylvania department, at Pittsburg, and the Riverside department at Wheeling, W. Va., aggregating $332,400.

American Steel & Wire Co.—Various improvements at Newburg steel works, Consolidated works, American works, Emma furnace, and Central furnace docks, in the Cleveland district; at Shoenberger works, Rankin works, Edith furnace, Neville furnaces, in the Pittsburg district; at Waukegan, DeKalb, Rockdale, Scott street, and Anderson works, in the Chicago district, and at Worcester (Mass.) works and Allentown (Pa.) works to the aggregate amount of $4,535,000.

American Sheet Steel Co.—The rebuilding with modern equipment and buildings of the Canal Dover plant, at Canal Dover, O.; an addition to the polishing department at the Wellsville plant; the improvement of the McKeesport works, at McKeesport, Pa.; the erection and installation at Vandergrift works, Vandergrift, Pa., of improved and modern operating methods, all of the above to cost $335,000.

Carnegie Steel Co., at Homestead Works, Homestead, Pa.—The erection of an additional 140-inch plate mill; the improvement of the 33-inch mill and of the boiler plant; $1,350,000.

At Edgar Thomson Works, Braddock, Pa.—Addition to steel and iron foundry and installation of new and modern blowing engines, in place of old and obsolete types, $275,000.

At Duquesne Works, Munhall, Pa.—Sundry additions and improvements to existing plants, $330,000.

National Steel Co.—Additions and improvements to existing plants at New Castle, Pa., Bellaire, O., and Youngstown, O., $1,592,000.

American Steel Hoop Co.—Additions and improvements at Isabella furnace, Pittsburg, and the Upper Union mills, Youngstown, O., $285,000.

American Tin Plate Co.—The installation at various of its mills of modern and improved methods of operating, $1,000,000.

H. C. Frick Coke Co.—The development of coke and steam coal properties, including the erection of additional ovens, $445,000. This improvement, it is estimated, will increase the productive capacity of coke 275,000 tons per annum and of steam coal 600,000 tons per annum.

Mining companies—The erection of a crusher plant at Escanaba, Mich., $143,810, with an annual capacity for crushing 510,000 tons of ore. Also the erection of additional power houses, shafts and mining plants on the Vermillion, Gogebic and Menominee ranges, $317,000.

Transportation properties:

Duluth, Missabe & Northern Railway—Additional locomotives, the extension of ore dock at Duluth, and sundry improvements at shops, $347,679.

Duluth & Iron Range Railway—Sundry improvements to shops, bridges and line of roads, $175,000.

Chicago, Lake Shore & Eastern Railway—Additional steel cars, $300,000.

Pittsburg Steamship Co.—The installation of steam towing machines on bridges and the alteration and improvement of fleet, $208,000.

Pittsburg & Conneaut Dock Co.—The improvement of unloading machines, $40,000.

The stockholders of the Brown Corliss Engine Co., Corliss, Wis., at a special meeting on Feb. 26, decided to increase the capitalization from $1,000,000 to $1,200,000. The payments will be called in three monthly assessments on March, April and May 1. In its original circular suggesting the increase the company says it has just started in on rolling mill and blowing engines and expects to receive considerable of this work in the near future. It had figured on $1,295,464 worth of work between Dec. 2 and Feb. 16, of which it has secured a portion and expects to secure a large amount. A recent outlay of $45,000 was necessary, for houses for employes of the company. A number of the stockholders are prominently identified with Pittsburg interests.

Dodge & Day, of Philadelphia, have been commissioned by the Ingersoll-Sergeant Drill Co. to report on variable speed motor equipment for the new Phillipsburg plant, and have been awarded the contract to equip with motor drives a number of the large machine tools.

The Pittsburg Filter Mfg. Co., Empire Bldg., Pittsburg, has opened an office at 29 Broadway, New York. It has been placed in charge of R. Dorn, who was formerly with the Industrial Water Co., of New York.

Oglebay, Norton & Co., Cleveland, have issued their annual ore book in which they give analyses of the ores which they offer for sale, viz., old range Bessemer, old range non-Bessemer, old range manganiferous and silicious ores.

Cleveland Machinery Market.

OFFICE OF *The Iron Trade Review*,
616 ROSE BUILDING, March 3.

A highly gratifying amount of business has been done in the past two months. Prices in nearly all cases have remained stationary. The prospect is that a large amount of building will be done next summer.

The Vulcanus Forging Co.'s plant is now a very busy place. Orders have been taken for forging for 625 Southern Pacific tank cars and pins for 1,000 Erie gondolas. A. G. Hathaway has resigned as vice president of the company and President Kindl will devote his time to the works for several months.

The Cleveland Pneumatic Tool Co. is receiving a large number of orders for pneumatic chippers and riveters, having received three large orders for shipments to foreign countries and made large sales to the Grand Trunk Railway, Pennsylvania Steel Co., McClintic-Marshall Co., Heyl & Patterson, Kilby Mfg. Co. and others. Business for February, 1903, shows an increase of more than 80 percent over that of the corresponding month for last year.

The Cleveland Crane & Car Co. finds that business shows a marked improvement over the same time last year, and the prospect for new work in both small and large traveling cranes is very bright.

The Chisholm & Moore Mfg. Co. reports great activity in its hoist and trolley departments.

Among the orders recently taken by the Edmunds Elevator Co. were the following: Four belt elevators for the Sherwin-Williams Co., three to be placed in its factory at Pullman and one in its factory at Newark, N. J.; belt elevator for the Akron Foundry Co., Akron, O.; belt elevator for the Wagner Mfg. Co., city; belt elevator for the American Cereal Co., Akron, O.; electric freight elevator for Greive & George, city; electric freight elevator for the American Motor Carriage Co., city; direct electric passenger elevator for the Trumbull County Court House, Warren, O.; direct electric freight for the Sharon Foundry Co., Sharon, Pa.; hand elevator for the Koblitz & Kohn apartment house, city; hydraulic elevator for the American Linseed Co., city.

The G. C. Kuhlman Car Co., Collinwood, is turning out a new kind of baggage car that electric railroads are adopting. The construction of the bottom of the car is of special interest owing to recent criticisms of the flimsy construction of baggage and mail cars. The bottom construction of these cars is as follows: Bottom framing of the best long leaf yellow pine. Two side sills made of 8-inch channels, 18 pounds to the foot, running the whole length of the car. Bumpers of ¾x12-inch plates (steel). The end sills are made of 5x8-inch oak held in place by heavy angle irons bolted on each side to the center sills and on the inside to the side sills. All cross sills to be made of 5x8 y. p. tied together by ¾-inch rods running full width of the bottom. The center sills are built of 7-inch I-beams filled in on both sides with y. p., and the whole bolted firmly together. The under trussing consists of four 1⅜-inch round iron rods with turnbuckles and strutts to support them. There is one truss rod under each end of the side sills and two under the middle. The truss needle beams are of 8x6 white oak extending full width of the car strengthened with two ¾-inch truss rods fitted with necessary washers, strutts, etc.

The Globe Machine & Stamping Co. reports that it has sold numerous sensitive drills during the past two months, and also that the sales of the new oblique tumbling barrel, which it commenced marketing in January, have been very satisfactory.

The Upson Nut Co. states that the outlook is for very heavy volume of business for the next six months and it sees no signs of anything but improved satisfactory conditions, at least during that period.

Mr. Chase, of the National-Acme Mfg. Co., expects to leave for England and the Continent this week to give personal attention for six weeks or two months to rapidly growing European trade of the company.

The Cleveland Elevator Bucket Co. is fitting up a large new grain elevator being built at Montreal, Can., with the company's patent sheet steel elevator buckets, the order taking something over 3,000 large size buckets.

The Elwell-Parker Electric Co. has recently contracted for twenty-nine large hoisting and crane motors in sizes from 75 to 150 h. p. These are special machines for high intermittent duty.

The C. O. Bartlett & Snow Co. finds that the mail is decreasing to considerable extent, as inquiries are not quite as numerous as they were two months or a month ago. The company is getting quite a number of orders for its dryer for drying clays, coal, marls, etc., and also for its conveying and elevating machinery. There seems to be a great demand for labor saving machinery throughout the United States, especially in the handling of coal, ashes, etc.

The work on the new plant of the Interstate Engineering Co., at Bedford, O., has progressed with marked rapidity, and most of the machinery has been purchased and operations will begin in a very short time. The additional buildings will be erected as quickly as possible, and a model plant will be represented in every way. Contracts have been taken for extensive steel construction and the building of large special machinery, which will keep the shops busy for six or eight months to come.

The Cleveland Punch & Shear Works Co. has secured an order for the entire equipment in its line of the New American Structural Steel Co., of Pittsburg, which is erecting a large shop for structural work. The president of this new company is Mr. C. A. Balph, of Pittsburg.

Chas. H. Erickson, assistant master mechanic of the works of the American Steel & Wire Co. at Worcester, has resigned and has accepted the position of superintendent of the plant of the Cleveland Wire Spring Co. Mr. Erickson is a native of Sweden. Although only 23 years old, he made such a record as to attract the attention of W. A. Comstock, secretary of the Cleveland concern, who went to Worcester and induced him to come to Cleveland.

The Standard Welding Co. states that there is strenuous activity in all lines of manufacture contributing to the production of automobiles. The demand for all classes of metal entering into the construction of these vehicles is extremely urgent. The manufacturers of these vehicles have taken on an amount of business in most cases that it is almost a physical impossibility to meet with any degree of satisfaction, either to their customers or themselves. Consequently the manufacturer of the various classes of goods represented finds himself in practically the same position—absolute inability to meet the demand within the time called for. The automobile business is in an evolutionary stage and each month brings marked changes and each active manufacturer of these vehicles is anxious to embody in this season's machines the latest improvements. In almost all cases these improvements involve special machinery, oftentimes peculiar forms of metal that make it extremely difficult to obtain with any degree of promptness. The relations between the parts manufacturer and the maker of the completed vehicle are thus strained to the utmost and will continue to be for the next four or five months.

The plant of the Fraser Machine Works is being remodeled with a view to carrying on a complete line of die work, screw machine work, experimental and model work in addition to the regular line of work. The new manager, Mr. N. W. Thomas, has had a wide experience on a great variety of work.

The Reliance Gauge Column Co. has recently placed on the market the Reliance low water alarm for steam carriages and is meeting with the most flattering success in this department. A number of manufacturers of steam carriages have adopted this new alarm as a part of their standard equipment, the company's last order being from the Jackson Automobile Co., Jackson, Mich., for 50 columns to equip the same number of steam carriages which that company is running through in one lot.

F. H. Bultman & Co. have orders for automatic gear cutters to keep them busy for the next six months. The firm's gear cutters are constantly going on gears, electric cranes and automobiles.

The Marshall & Huschart Machinery Co. reports a very nice volume of business for February, and the continuance for the following month will, from every prospect, be even greater than the present one. No large orders have been received, although the smaller ones are quite numerous. There seems to be a general demand for the most modern machinery from every class of trade; motor driven tools being in some cases predominant over the belt drive.

LAKE SUPERIOR IRON MINES.

Corrigan, McKinney & Co. are vigorously preparing for the coming year's mining operations on the Mesabi range, as well as at their old range properties at Crystal Falls and Bessemer, Mich. At the Stevenson they have been making numerous important changes, these including new machine shops, round houses, and other surface buildings. The machine shop is filled with excellent machinery of the latest type. The mine will begin stripping in a short time and is down for an output of something less than 2,000,000 tons, but considerably more than the 1,435,000 of last year. At the company's Commodore they have two immense sinking pumps, which have been throwing out water at the rate of 3,000 gallons a minute. The mine is in pretty bad shape underground and it will take some time to get it into readiness for mining. But it is expected to make a considerable output this year. At the firm's Jordan, in 58-20, they expect to more than double the output of last year, which was 180,000 tons. Two new mines are to be opened in section 24-57-22, recently leased from Longyear & Bennett. These will not mine much this year. These properties lie close to that recently bought by the Clairton Steel Co. and the Shenango Iron Co. Corrigan, McKinney & Co. have twelve drills at work on the Mesabi range, three of which were started this week. At their Tobin, Crystal Falls, they have a prospectively very large property, for the ore body has been traced a long distance and if it has depth is a very important mine. The Armenia is proving a big property also, and its shipments this year will be heavy. Their Great Western is showing up well, and with a new machinery equipment is prepared to mine a great deal of ore, if the market wants a slightly manganiferous ore. The Crystal Falls and Lamont are large properties and they are doing considerable development elsewhere on the range. Their Armenia is developing into a large property, and though its ore is a soft red mud, it is not especially moist in analysis. On the Mesabi they have also the Laura and Winnifred, and these will be considerable shippers. The firm's shipments for 1902 were 2,224,000 tons, which will be materially increased the coming season.

The "Mueller tract," Mesabi range, over which there has been long litigation and which has been referred to in daily papers as very valuable, is not yet explored sufficiently to warrant any statement. It lies well, and there are known ore deposits on three sides of it, which, on the Mesabi, is a pretty good indication. It is 80 acres in section 15 and the same in section 22, T 58 R 19, and the U. S. Steel Corporation has an option for a lease from the record owner, who has won out in the suits. The Oliver Iron Mining Co. had the option and will explore as soon as the title is fixed. The case has been somewhat remarkable for the number of posthumous widows and orphans who have cropped up all over the country since the tract was first exploited as valuable. Mueller himself died practically a pauper, with no known relatives. But heirship was of no importance, as the land had been sold by Mueller before death to a Duluth Roman Catholic priest.

State leases continue to be demanded by those who think the so-called Highland range is to be another Mesabi. The Highland range is the crest of the divide between the watershed of Lake Superior direct and that of the Cloquet river waters, which reach the lake through the St. Louis river. Its only apparent recommendations are that it is the "right elevation," that is, the same elevation as that of the contour lines passing through most of the Mesabi range mines, and that slight traces of yellow and red oxydized ores have been run into at points along the crest, but these are merely hydrated and oxydized magnetites from the thin seams found constantly in the basaltic rocks of the district. Nevertheless a good many citizens of Minnesota, who have looked on enviously at the fortunes made on the Mesabi, are anxious to try their luck and will prospect there the coming summer.

The Great Northern road has commenced grading for its cutoff from Kelley lake, section 15 T 57 R 21, to the center of T 58 R 20, at which point it will connect with the present line. This new line carries the road south of the numerous finds about Hibbing and off lands that are to be opened for mining this year.

The Duluth, Missabe & Northern road is building a spur into the Chisholm mine, which has been under contract to ship over the Great Northern, and will haul ore from the new No. 2 shaft, now being sunk. The present shaft is getting exhausted and will be abandoned at no distant day.

It is not likely that the Elizabeth, of Pickands, Mather & Co., will ship ore this year. No plans have been made for opening it.

A good deal of interest is evoked by the beginning of operations near Swanzey by the Cleveland-Cliffs, which has secured the lands of the Escanaba River Land Co., aside from the part included in the old Swanzey, now the Princeton mine. Ore has been cut by drills and the company will sink a shaft at once, as well as to explore with drills. Other parties will enter the district, which is an offshoot of the Marquette district, and there will be much exploration there this year.

The I. Stephenson railroad, the Escanaba & Lake Superior, is to be extended this year to lands near the upper waters of the Escanaba river, where ore is said to have been found on lands owned by the company.

The Troy, a new mine at Eveleth, belonging to Pickands, Mather & Co., is commencing stockpiling and will make a considerable shipment this year.

The new big shaft of the Savoy mine, Vermillion range, is in commission with the 165-ft. steel headframe, and is hoisting some ore. It will not be running steadily and full for a little while yet.

Important improvements are to be made at the Republic mine, Marquette range, now owned by the Cambria Steel Co. Much of the old machinery will be replaced. Two of the present engine houses will be abandoned entirely, and fewer men will be necessary. The Allis engine house will be provided with a new hoist, with two first motion drums. The latter will be larger and faster than those now in use. The Pasco shaft will have a double skip road and all the hoisting there will be done from the Allis plant. Two 100-h. p. Babcock & Wilcox water tube boilers will be installed at No. 5 engine house. They will be the only boilers of this type on that range.

Obituary.

R. J. Gatling, inventor of the Gatling gun, died in New York, Feb. 26, aged 84 years, five months. Dr. Gatling, besides the gun which bears his name, invented a number of agricultural implements and a gun metal. Although he graduated from Ohio Medical College he never practiced medicine. A great disappointment of his life was the failure of the eight-inch gun which he invented in 1897. It involved a radical departure from accepted methods of gun making, being cast in steel in one piece, and bored out and forged on the inside. It was cast by the Otis Steel Co., Cleveland, bored out and forged by the Cleveland City Forge & Iron Co. and finished by the Otis Co. The gun exploded in a test firing at Sandy Hook, not because of any fault in the making, but because, in the opinion of the government officials, a cast steel gun could not be depended upon. In 1902 he invented an automobile plow, designed to do the work of six men and twelve horses.

Chas. Scott Snead died at his home in Louisville, Ky., Feb. 25, aged 83 years. He had been in the agricultural iron business from 1848, when he built the first Snead Iron Works, until in 1898, the plant, which had grown to large proportions, burned. He then retired from active business.

James A. Kennedy, general manager of the Girard Iron Co., of Youngstown, O., died at the Mahoning Valley hospital at that place Feb. 25. He was 42 years old. His connection with the Girard Iron Co. dates back many years.

Pig Iron Production in Germany.

The production of pig iron in Germany last year was 7,648,665 tons, as compared with 7,144,342 tons in 1901, and 7,630,952 tons in 1900. Thomas pig figured in these totals for 4,735,015 tons, 4,102,241 tons, and 4,370,046 tons respectively. The price of Thomas pig in Germany at the close of November last year was $13.90 per ton, as compared with $13.75 per ton at the close of November, 1901, and $19.60 per ton at the close of November, 1900.

The Mannie furnace at Allen's Creek, Tenn., which has been out of blast for about three months, has completed repairs, and was blown in on Feb. 23.

The Eastern Machinery Market.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., NEW YORK, March 3.

Considering that it was the shortest month of the year, and was broken in upon by holidays and very severe weather, February in the machinery market in this vicinity gave general satisfaction. The closing days in particular, found trade quite brisk. All branches of the machinery industry were favored in the matter of business. As in January, the orders were made up for the most part of small lots. In machine tools this was particularly the case; in fact, more orders calling for but one or two tools being placed then than in some time. There are still several large machine tool contracts hanging fire, but an indisposition to close them is shown. The hesitancy is thought to be due to changing conditions in the cost and transportation of pig iron. Nevertheless machine tool business continues profitable, and many concerns note a decided increase in the number of orders as compared with the corresponding period last year.

The buying of machine tools is not only notable for the orders being widely distributed, but for the many sections from which they emanate. Territorial limits exert little influence nowadays. The buyer gets what best meets his needs, without regard to location of the manufactory, or to freight charges or, in many cases, to deliveries. It is evident that much more enterprise is being shown by manufacturers in letting the consuming trade know what they have to offer.

The new plant of Henry R. Worthington, at Harrison, N. J., will not be equipped probably for several months, although the specifications are practically ready for the trade. The Ingersoll-Sergeant Drill Co. is now engaged in purchasing the machinery for its new plant at Phillipsburg, N. J., and has already given out some orders, the crane orders calling for 14 cranes of different sizes having been given to Pawling & Harnischfeger, of Milwaukee, Wis. There is still a good quantity of machinery to be purchased. The equipment for the new shops of the Westinghouse Electric & Mfg. Co., at East Pittsburg, and which, it is said, will involve an outlay of about $1,000,000, is expected to be heard from in the near future. Word comes from Schenectady, N. Y., that the General Electric Co. will soon make its appearance in the "street" as a large buyer of machine tools. The company is now letting contracts for the construction of a new 150x600 feet addition to its plant, which will be used exclusively for the manufacture of steam turbines, a branch of its business which has made notable strides during the past few months. The formal transfer of the Stanley Electric Co. to the General Electric Co. has been made and plans are now being perfected for a substantial addition to the Stanley company's plant at Pittsfield, Mass., which will involve a large order for machine tools.

Deliveries of machine tools were not as good during February as in January, for which the severe weather and freight congestion were largely responsible. New England manufacturers are loud in their complaints on the latter score, and some of their representatives here declare they have lost business as a result of it. This condition has not improved to any great extent. In other departments of the machinery industry, the month was without particular feature, except in engines. Manufacturers reporting that there have been unaccountable delays in placing orders for engines representing large horsepower. In boilers the business has been good. Dealers in machinists', founders' and engineers' supplies say the month was very satisfactory in their respective lines. In electrical equipment, the situation is of the best. Business is making its appearance in surprisingly large volume, and manufacturers say they never remembered the outlook being more favorable than it is at present.

Prices of machinery in general show a decided stiffening. While considerable is heard about further advances, we do not find that they have actually been obtained. That manufacturers are in the mood for it can be stated without any hesitation, one large machine tool merchant saying that all indications point to some action of this kind in the near future in machine tools, if the cost of raw material and freights continue the upward tendency recently noted.

The export machinery trade dragged along in the same listless fashion during February as for many months past. Manufacturers still find it true that home trade affords the most attractive field for their energies despite the fact that consular reports abound in references to opportunities for the sale of their products in the markets of Continental Europe.

MacKenzie & Quarrier, of 203 Broadway, representing the Harrisburg Foundry & Machine Works, have received the order for three 300-h. p. tandem compound engines to be installed at the new Knickerbocker Hotel, at Forty-second St., this city. They will be of the standard Harrisburg make, and will be direct connected to a 200-k. w. generator.

The Webster Manufacturing Co., of Chicago, whose local offices are at 38 Dey St., received some good orders for conveying machinery during the month for use in industrial establishments in the Eastern States. The company's business so far this year is some 30 percent better than for a corresponding period last year.

The Crocker-Wheeler Co., of 39 Cortland St., find the erection of beet sugar mills in the west responsible for some excellent orders for electrical equipment. During February the company received 16 orders for engine type generators from this source, aggregating 640 kilowatts. Other orders recently booked by this company include one 350-k. w. engine type generator from the Wilmington Malleable Iron Co., of Wilmington, Del.; 19 motors of various sizes for use in the Government's printing department at Washington, D. C.; for 45-k. w. motors, from the Kleinert Rubber Co., College Point, L. I.; ten additional motors, from the New York Improvement & Real Estate Co., New York City, making thirty motors in all for that company; and one 50-k. w. engine type generator, from the Metz Color Works, Newark, N. J. The company's foreign business is improving, and it has received orders for two 8-k. w. generators for Japan, and for additional apparatus for Siberia, to which it made a large shipment about a year ago.

The Buckeye Engine Co., of Salem, O., whose head office at 39 Cortland St. is in charge of Paul Bigelow, did an extremely good bsuiness during February. Some of the orders received were for the following: One 400-h. p. engine, from the Washburn Wire Co., New York City; two 160, and two 125-h. p. engines, from the Metropolitan Gas Light Co., New York City; one 300-h. p. engine, from the Wilmington Malleable Iron Co., Wilmington, Del.; one 250-h. p. engine, from Milliken Bros., of Brooklyn, N. Y., for installation in their new plant at Staten Island, N. Y.; one 205-h. p. engine, from the New York American Gas Co., Ravenswood, L. I.; and one 100-h. p. engine, from the Seamless Rubber Co., New Haven, Conn.

The Allis-Chalmers Co., of 25 Broad St., this city, reports that its business in all lines for February was considerably in excess of that for January. The largest single order taken by the New York office during the month was for engines of different units aggregating 4,000 horsepower, from the Quaker Cement Co., of Easton, Pa.

The Thayer & Co., of 39 Cortlandt St., manufacturers of steam boilers, received orders for boilers in different units during the month from a well-known New York City company, aggregating 8,000 h. p. Another notable order received was for 2,000-h. p. boilers, from the New York Central & Hudson River Railroad, for installation in its station at Weehawken, N. J.

The James Beggs & Co., of 9 Dey St., who make a specialty of engine, boiler, and saw mill tools and supplies, report trade in all these branches as extremely good, with many propositions pending indicating some excellent orders fast nearing the closing point.

M. H. Treadwell & Co., engineers and founders, at 95 Liberty St., did some excellent business during February, especially with steel plants in and around Pittsburg, one order from this source calling for four 20-ton hot metal cars, and a large number of cinder cars. The crane department of this company is in receipt of some good orders, one of which was received from the Central Iron & Steel Co., of Harrisburg, Pa., and which called for two 10-ton three-motor electric overhead traveling cranes, to be equipped with Westinghouse electric motors and controllers. The company is in receipt of crane inquiries which are expected to bring forth some substantial orders.

Some New Things for the Shop, Chiefly by Way of the Patent Office.

Drill With Detachable Cutting Lips.

The grinding away of the cutting lips necessarily shortens the drill, and looking to the advantage of adding on metal to take the place of that removed by the abrasive wheel (either stone or emery), a party of inventors have agreed upon the following method of improving the familiar twist drill. The proposed improvement is shown

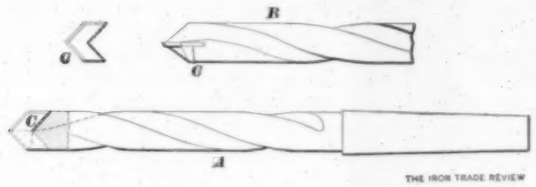


FIG. 1.—TWIST DRILL WITH DETACHABLE CUTTING LIPS.

in Fig. 1 and is the work of John, William and Henry Platt, of Oldham, Eng., the inventors "aforesaid." According to the scheme as planned, the cutting bit is removable and the drill has means for holding and centering the cutter; the latter being carried in the end of what has hitherto formed the drill proper. The drill as seen at A consists of the usual grooved spindle, the end being ground or turned off at an angle. A cross slot is then cut through the point of the drill, the bottom of the slot being cut to a V-shape as shown by the section at end of A. Another view of the drill point is illustrated at B. The cutting-bit C is made from flat steel of a thickness corresponding to the width of the holding slot and is of arrow-head shape, the inner edges abutting on the angles of the slot while the upper and outer V projects slightly beyond the point of the holder, as shown by the dotted line which represents the end of the spindle. The inner angles of the bit being made to fit the slot, the former automatically adjusts itself central to the holder and is held in place accurately and firmly.

The drill as shown by the patent drawings will have a cutter-bit with a face suitable for brass or similar metals. The face of the lips will conform to that of the Farmer drill—a drill having grooves which are parallel to the axis in place of being spiral. The lack of rake will not encourage the adoption of a device of this kind—in fact the freely cutting twist drill has left the Farmer type far in the rear for general shop purposes. The flat surfaces parallel with the axis are clearly shown at the cutting end C of the drill B.

The special point of interest is however in the main object sought by the improvement. This device is said to "obviate the necessity of grinding." And further along it is asserted that "when the bit is no longer effective it is readily driven out of the holder and replaced by a new bit, the latter being manufactured at a less cost than the time and power expended in regrinding, as heretofore practiced costs." This is a claim that such bits are cheaper than grinding drills and really the trend of manufacturing is to a stage where tool grinding will be specialized more than ever. The lathesman or planer hand is getting away from it, and the twist drill grinder is a step in the same direction. It is a far cry, however, to the renewable cutting edge for drills.

Positive Feed Gearing.

An English patent has been taken out by Thomas P. Macnab, of Romiley, Cheshire. The motion is shown in Figs. 2 and 3 as applied to a lathe, but obviously it is applicable to any machine in which two parallel shafts revolve, the one driving the other. The illustrations, Figs. 2 and 3, show the device arranged for three changes of speed, but the scheme may be extended in practice to any number of speeds required. A rack is cut in the sliding shaft A and into this meshes a small pinion B which is keyed on a spindle C. There is a hand wheel D on the spindle C, and when this is rotated the pinion B turns and moves the sliding rack A. The pinion B is in fixed bearings and the rack spindle A free to slide and so gives the necessary movement for inserting the key E into the various gear wheels F. The hand wheel D is indexed so that the operator can tell the position of the interlocking key and hence the rate of feed. A locking pin G is provided for fastening the handwheel at any desired point.

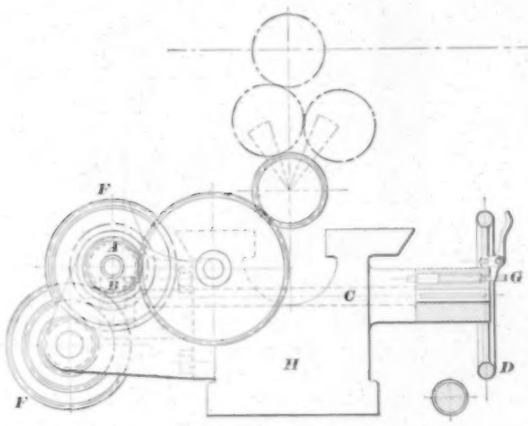


FIG. 2.—END VIEW OF LATHE WITH POSITIVE FEED GEARING.

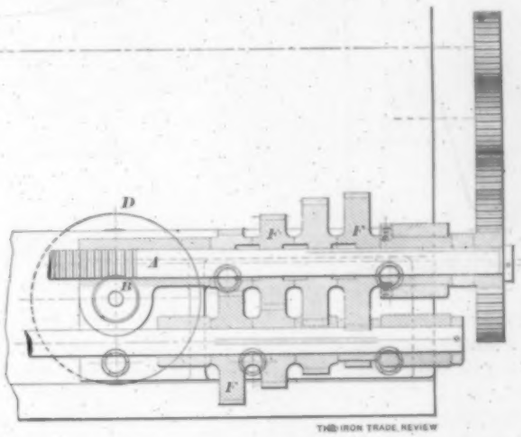


FIG. 3.—REAR VIEW OF FIG. 2.

Novel Pipe Tongs.

A pair of pipe tongs of novel type are shown in Figs. 4 and 5. Pipe tongs are common enough and their forms are legion, but there is a peculiar kink involved in the present invention which may suggest many another application of a like character. The scheme involves a rather neat idea. The pipe tongs shown have an adjustable bit in one of the jaws. The bit is made somewhat longer than the width of the jaw in order to afford a better grip with less injury to the pipe than if the bit were confined to the width of the jaw. The idea is good but often involves unpleasant consequences when the tongs are thrown on the floor—a common proceeding by the way. Nine times out of ten the projecting end of the bit will strike the ground and probably dislodge the wedge or break off the set-screw, etc. The fastening is occasionally lost at such times and this and the loosening of the bit is a nuisance. How far the inventor, William Maxwell, of Pittsburg, has

solved this difficulty will be seen on an examination of Figs. 4 and 5. The left hand view, Fig. 4, shows an ordinary pair of tongs with the usual inner and outer jaws A and B. The inner jaw has an angular groove C provided with a bit F. These parts are more clearly shown in their novel relationship by the views to the right, namely Fig. 5. Here the upper illustration is a transverse view, partly in section, taken along the line 5—5 of Fig. 4 with the bit removed. The lower view in Fig. 5 is a longitudinal section taken through the end of the inner jaw. The same letters are employed in each view to indicate identical parts.

The inner jaw A, having the angular groove C, has an annular channel D tapering downwards from the edge of the jaw. A ball E, made of rubber or any similar resilient material, is adapted for insertion in the channel, which is

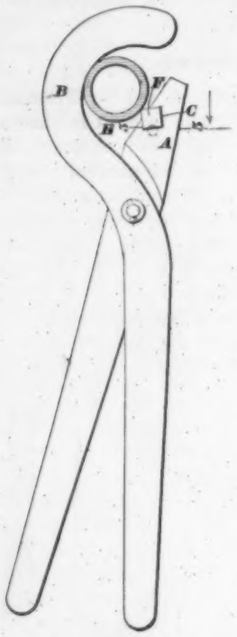


FIG. 4.—A NOVEL PAIR OF PIPE TONGS.

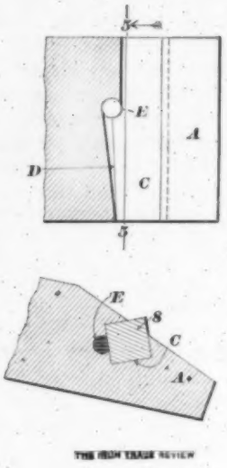


FIG. 5.—DETAILS OF THE PIPE TONG JAW.

deep enough to receive the ball at the lower end and allow a slight portion of it to project outside the cavity. The channel D is rounded to conform to the contour of the ball.

On inserting the rounded end of the bit F into the end of the jaw after the ball has been inserted in the channel, the rounded end of the bit will ride over the projecting portion of the ball, which owing to its expansive qualities, will force the bit against the opposite walls of the groove.

It is understood that the bit fits quite snugly in the groove and a very slight compression or expansion of the rubber ball will be sufficient to securely hold the bit in the jaw.

A Friction Tapping Device.

A patent recently granted to Gustav H. Hollm has been acquired by the Whitney Mfg. Co., of Hartford, Conn. The device is intended to provide a fixture which can be used in close quarters—in drilling close to the shoulders of hubs and similar places, to provide a chuck which will receive the common stock pattern tools having vertical keyways and one which does not require that the shanks of such tools be specially shaped. The improvement is so devised that the tools can be quickly inserted or removed without the necessity of stopping the machine. The tap will automatically stop when its work is completed and the tap is so held that it will run in or out of the work with the movement of the drill spindle or faster than the movement of the spindle if the pitch of the tap thread be greater than the spindle movement.

Fig. 6 is an elevation of the holder and tap and Fig. 7 is a vertical section showing A the body of the fixture, B the cap, C the check nut and D the tap holder. The shank A is carried by the socket of the drill spindle and has a conical bore and is threaded on the outside. There is a conical bushing D to fit the bore of the shank and this in turn has a bore to receive the shank of the tap. There is a fibre washer between the parts A, B and D as indicated by the heavy lines. The cap B and lock nut C can be nicely adjusted to hold the tap holder by any desired amount of friction.

FIG. 6.—ELEVATION OF TAP AND HOLDER.

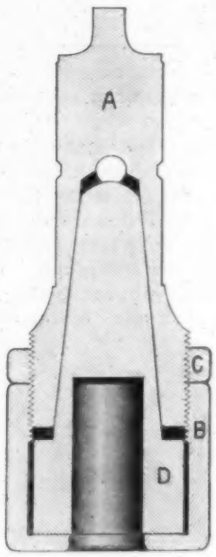


FIG. 7.—VERTICAL SECTION OF TAP HOLDER.

The patent contemplates the use of taps having keyways along the shank to receive the keys carried by the holder D and a frictional device may hold the tap within the holder, but in such a manner as to allow the tool to be fed down in advance of the movement of the chuck as in cases where the lead of the tap would not correspond with the feed movement. This friction device may consist of a bowed sheet-metal spring fitted into a vertical slot in the holder and arranged so as to press against the shank of the tap.

Belt Shifting Device For Planers, Shapers, Etc.

R. W. Cunliffe, W. Ashworth and others of the Broughton Iron Works, Salford, England, have invented a con-

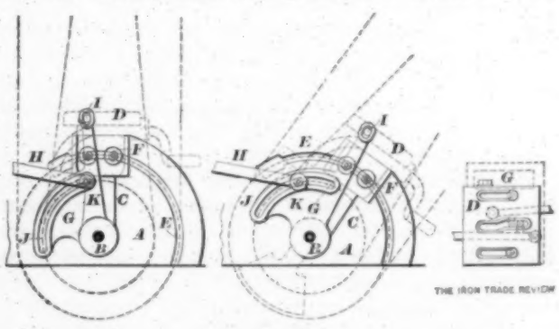


FIG. 8. FIG. 9. FIG. 10.

A BELT SHIFTING DEVICE FOR PLANERS, SHAPERS, ETC.

trivance which has received an English patent. The invention aims at providing an arrangement of the belt eyes in the shifter so that the belts may be used at any angle

from the vertical to below the horizontal and thereby enable the machine to be put in any position irrespective of the line shaft. Fig. 8 is an end view of the pulleys and belt shifting device adapted for a vertical drive; Fig. 9 is a similar view, but the line shaft is placed considerably to the right of the previous position; and Fig. 10 is a plain view of the slotted plate. The same letters are used for identical parts in each of the views.

The bed of the planer is depicted at A and the driving pulleys are mounted on the shaft B. C is the quadrant supporting the belt shifter plate D. There is a T-slot E in the side of the planer and by means of bolts F the quadrant may be set at any part of the slot. There is a lever G and link H by which the plate D is operated at each stroke of the table, the lever being mounted on the stud B and linked to the plate by a pin I. There is a quadrant slot J in the lever G in which the link H may be secured at any desired point by the bolt and nut K. The quadrant C may therefore be adjusted along the slot E and the link H is as easily located along the slot J in the desired relationship to suit any angle at which the belts may be required to run to the driving shaft as shown by the dotted lines.

Flexible Shafting.

H. W. A. Fette, of Altona-Ottensen, Germany, has been granted a patent in this country on a flexible shaft. He proposes to improve the current forms of flexible shafting

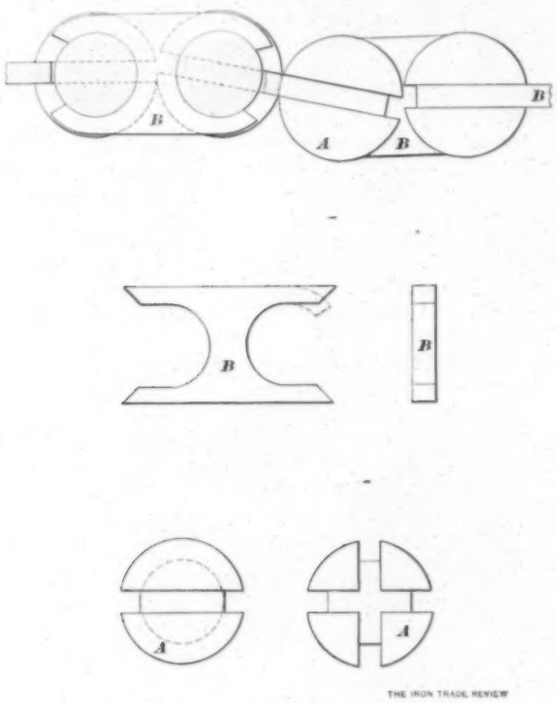


FIG. 11.—FLEXIBLE SHAFTING AND COMPONENTS.

by bringing the axes of the several members near together and thus increase the flexibility and durability of the device. Not content with this contract he proposes a cheaper and simpler contrivance, subject to less wear, and absorbing less power.

The three views of the device shown in Fig. 11 will illustrate in a general way the means whereby the inventor proposes to attain his objects. The shaft comprises a series of ball-shaped members A, each having two grooves crossing at right angles and passing around the circumference. Two views of one of these balls are shown in the lower part of Fig. 11.

Between a series of these balls A are arranged flat connecting links B having right and left concave sockets so that each link will embrace two of the balls. When assembling the parts, the prongs are brought into engagement with the grooves of the balls and are then slightly bent inward to interlock the parts, adjoining links being arranged at right angles to each other. The bending of the prongs inward is shown by dotted lines on the middle view of one of the flat links. Evidently in construction on a large scale, the connecting plates B may be made in two halves fitting together by means of a dovetail or other dowel and the two fastened by screws or rivets.

The crossing of the two axes of rotation at this angle and the short distance between the links of the several members gives a considerable degree of mobility as will be seen by the assembled shaft shown in the upper view of Fig. 11.

A Simple Pipe-Wrench.

Wrenches are ground out by the Patent Office with monotonous regularity and it would seem that there was little room for anything new and scant hope at that for a simple form of pipe-wrench. The invention of Stephen Stucky, of Oxford, Ala., is nevertheless in that class and the tool as shown in Fig. 12 almost tells its own story. The wrench is a variation of the well-known alligator type. The lever or shank being bent up at B to form the stationary jaw, and having its inner side cut with teeth to firmly grip the pipe. The resemblance to the common alligator wrench stops at this point, however. A sliding jaw D consists of a loop embracing the handle bar and

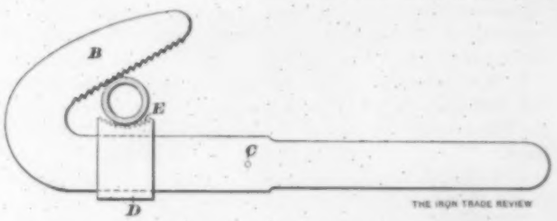


FIG. 12.—A SIMPLE PIPE WRENCH.

having a depression at E which is serrated to match the under side of the fixed jaw B. The pin C serves as a stop to prevent the outward movement of the movable jaw beyond the pipe range of the fixed member B.

The part D is applied to the pipe and then both are drawn toward the jaw B until the two sets of teeth bite the work. There are only the two parts and the stop pin and it is hard to see any way of reducing the number and retain the adjustable feature save by a reversion to the one piece alligator wrench.

An agreement of consolidation and merger between the Passaic Rolling Mill Co. and the Passaic Steel Co., both of Paterson, N. J., has been filed in the office of the secretary of state of New Jersey. The capital of the concern is $5,000,000. The directors are George A. Lee, of Philadelphia; Dudley Phelps, of New York; H. F. Bell, J. B. Cooke, A. C. Fairchild and F. F. Leany, of Paterson.

Because the officials of the Turner & Seymour Mfg. Co., at Torrington, Ct., refused to discharge a man who owed the foundry workers' union $5.50, 110 men in the foundry department of the company went on strike last week. The company officials declare that it is impossible for them to discharge the man. He is under a two years' contract with the firm and the question of his dues to the union is something over which they have no jurisdiction; neither would they be justified in deducting the amount from the man's salary.

The sheet mills of the Canal Dover (O.) district have not operated regularly for some time past. Only ten have worked during the past six months out of a total of 33 and six are now in operation.

Owing to the increasing demand for their goods, W. W. and C. F. Tucker, of Hartford, Conn., makers of oil-hole covers and cups, have been obliged to double up their plant to keep pace with orders.

The Selkirk Fence Co. has moved from Haldimond, N. Y., to Welland, N. Y.

PERSONAL.

Robt. H. Jeffrey, of the Jeffrey Mfg. Co., Columbus, has been nominated by the Republicans for mayor of Ohio's capital city. The nomination was the result of a movement among business men.

Chas. S. Powell, who for six years has been manager of the Cleveland office of the Westinghouse Electric & Mfg. Co., has been appointed assistant manager of the British Westinghouse Electric & Mfg. Co., and has entered upon the duties of his new position, with headquarters in the Westinghouse building, Norfolk Street, Strand, London, W. C.

It is understood that the recent resignation of H. C. Frick as a director of the Pittsburg Coal Co. was due to arrangements under which a larger portion of his time will be given in an advisory and executive capacity to the United States Steel Corporation.

Prof. John H. Barr, head of the department of machine design at Sibley College, of Cornell University, Ithaca, N. Y., has tendered his resignation in order to accept the position of general manager of the Smith-Premier Typewriter Co., of Syracuse, N. Y.

Paul Möller, special delegate of the Society of German Engineers, is in this country studying the conditions and methods of the engineering industries and will later publish the result of his investigations in the journal of his Society.

J. D. Hurley and A. B. Holmes, formerly connected with the Standard Pneumatic Tool Co., are now associated with the Rand Drill Co., in the "Imperial" pneumatic tool department.

A. G. Hathaway has resigned his position as vice president of the Vulcanus Forging Co., Cleveland.

Following other resignations of American Sheet Steel Co. officials comes that of Ambrose Beard, division superintendent, Canal Dover, Ohio, in charge of the mills at that point, and also those of Canton, New Philadelphia, Dennison and Dresden. Mr. Beard has asked that his resignation take effect April 1, and will enter some other line of business after that date, being obligated by the 15-year agreement not to engage himself to any other company of sheet steel manufacturers. Mr. Beard has been employed since a boy in various departments of manufacturing sheet steel and tin plate and is familiar with every detail from the scrap shears, where he first commenced work, to the office. The vacancy to be created by the resignation of Mr. Beard, will be filled by the promotion of T. J. Haley, formerly his assistant.

John S. Oursler has become superintendent of the New Castle steel works and furnaces of the National Steel Co., following the recent appointment of John Reis to be general superintendent of New Castle and Sharon Steel Co. plants.

John Stevenson, Jr., for nearly three years vice president of the Sharon Steel Co., of Sharon, Pa., and through whose efforts the present extensive plant at Sharon was erected, sailed from New York for Naples with his family last week. Before his departure from Sharon he was presented with a handsome piece of bronze statuary by his former employes in the Sharon Steel Co., by whom he was held in high esteem. Mr. Stevenson, in severing his connection with the company, presented about 100 employes and heads of departments with checks in amounts from $10 to $500.

R. T. Turner, who was connected with the Pittsburg sales-office of the American Sheet Steel Co. for several years, has been transferred to the Detroit office of that company.

E. E. Slick has been appointed chief engineer of the New Castle district, covering steel works and furnaces of the National Steel Co. at New Castle, steel works and furnace of the National Steel Co. at Sharon, and the blast furnaces, open-hearth department, blooming mul and plate mill of the Sharon Steel Co. at South Sharon, Pa.

The Sandusky Automobile Co., Sandusky, O., recently placed an order with the Sandusky Foundry & Machine Co. for 200 gasoline engines.

The Cleveland Hardware Co., Cleveland, is installing a complete electrical equipment for the operation of its plant, and has recently purchased from the Westinghouse Electric & Mfg. Co., one 75-k. w. and one 100-k. w., two-phase alternators, together with exciters, switchboard, ten 20-h. p. motors and two 10-h. p. motors.

Vice-President Mellon's View of the Union-Sharon Deal.

In a letter to the Union Trust Co., of Pittsburg, A. W. Mellon, vice president of the Union Steel Co., of Sharon and Donora, Pa., presents some interesting points in the sale of these properties to the United States Steel Corporation. The total bond issue is $45,000,000, as was stated at the time of the purchase, constituting a first lien on the plants of the Union Steel Co. and the Sharon plants only, subject to the prior Sharon bonds, amounting to $3,500,000, against which bonds of the present issue are held as security, thus making the entire new issue only $41,500,000. The letter further states that the contracts for the merger and organization of the Union Steel Co. and the mortgage securing this issue of bonds provide sufficient of the bonds, about $12,000,000, to pay for the new construction now under way and for additions and extensions required. Heretofore this amount has been placed at about $10,000,000, and taking Mr. Mellon's figures, the amount derived from the sale of these properties to the United States Steel Corporation amounted to only $29,500,000, instead of $33,000,000, which has been spoken of as the purchase price, the stockholders realizing the former sum and the corporation assuming the Sharon bond issues. According to previous statements it might be inferred that the stockholders secured $33,000,000 for their stock and in addition the corporation assumed the $3,500,000 bond issue, but according to Mr. Mellon's letter, this is not the case.

The sinking fund feature is also touched upon and indicates that the United States Steel Corporation made an excellent deal in the purchase of these properties. There will be paid to the trustees of the bonds annually 2 percent upon the entire issue of bonds outstanding, which is to be used in the purchase of bonds at a price not exceeding 110 and interest, or after 1907, in the redemption of bonds at 110 and interest; all bonds so purchased or redeemed for sinking fund to continue to bear interest for the sinking fund. Under these provisions the sinking fund with its accumulations, will retire and extinguish the total bonded indebtedness in 27 years, although the bonds bearing 5 percent interest are not due until Dec. 1, 1952. Thus the United States Steel Corporation will come into the properties of the Sharon and Union companies in 27 years without the outlay of a dollar, and in addition will secure the profits over and above the fixed charges during this period.

Mr. Mellon estimates that the net earnings of the properties after the present additions are completed will amount to $8,000,000 annually. While his estimate is considered unduly high by many, it is an interesting point in view of the retirement of the bond issue by a sinking fund as noted above. Should Mr. Mellon's estimate prove true the United States Steel Corporation will realize in profits in the next 27 years $216,000,000, and meantime the properties will have paid for themselves besides. Mr. Mellon's letter presents the purchase of these properties as the greatest stroke of financiering since the organization of the United States Steel Corporation itself.

The Island Valley Coal & Iron Co., Linton, Indiana, which recently increased its capital from $10,000 to $40,000, expects to develop property which it has acquired in Greene and Clay County, near Jasonville, and work will be commenced as soon as the weather will permit.

The Black & Clawson Co., which manufactures paper mill machinery at Hamilton, O., has been purchased by a syndicate composed of Bradford Shinkle, of Covington, Ky., Frank W. Whitaker, O. N. Blake and B. Strauss, of Hamilton, and reincorporated with a capital of $1,000,000. About $100,000 will be spent in improving the plant.

ANGLE STRAIGHTENING MACHINE.

We give four illustrations of various types of angle straightening machines built by the United Engineering & Foundry Co. of Pittsburg. Fig. 1, shows the No. 1 machine arranged with independent top screws for adjusting each top roll separately. Fig. 2 shows the No. 2 machine, the smallest type built. This machine is so arranged that the adjustment of the top rolls can be controlled by one hand wheel. Fig. 3 represents the No. 0 machine arranged for belt drive with the top rolls adjusted by three hand wheels, giving a separate adjustment for each roll. Fig. 4 shows the No. 1 machine motor driven with the top roll adjustment controlled by one hand wheel. These machines are built in four sizes, the No. 2 is designed to straighten up to and including 2x2-inch angles. The No. 1 will straighten from 2x2-inch angles up to 4x4-inch angles. The No. 0 will straighten from 4x4-inch angles up to 6x6-inch angles, and the No. 00 will straighten from 6x6-inch angles up to and including 8x8x1-inch angles or the heaviest section of angle rolled at the present time. These machines are all built for either belt, direct-connected engine or motor drive and

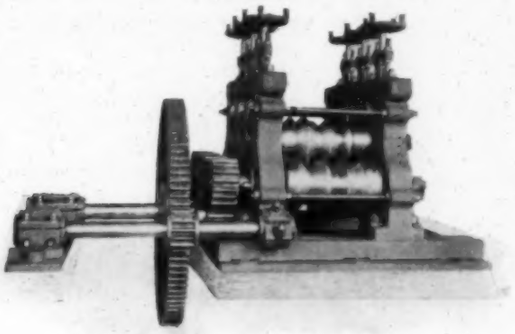


FIG. 1.—ANGLE STRAIGHTENING MACHINE.

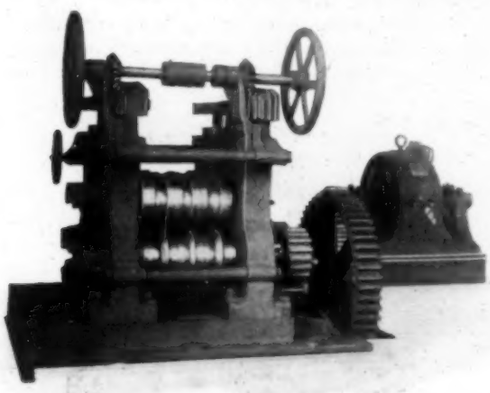


FIG. 2.—ANGLE STRAIGHTENING MACHINE.

are all seven-roll type, furnished with either sand, chilled or cast steel rolls. The gears are all made of cast steel and where a motor drive is used the motor pinion and gear have cut teeth. The rolls are easily removed for replacement or returning by sliding one housing along on the bed plates, which are made long for this purpose.

These machines are well adapted to straightening irregular shapes such as U bars, Z bars, rails channels and I beams and can be operated at a high rate of speed, thus giving a large tonnage per day with a small operating cost both for power and labor. The cheapest labor may be employed, as the machine practically runs itself after being adjusted for the size of material to be straightened.

The United Engineering & Foundry Co. has built various sizes of these machines for several large iron and steel concerns including the Midland Rolling Mill Co., Shelby Steel Tube Co., American Steel Hoop Co., Chester Iron & Steel Co., Carnegie Steel Co., Republic Iron & Steel Co., Franklin Rolling Mill Co., Lockhart Iron & Steel Co., Inland Steel Co., Eastern Steel Co., Tudor Iron Works, Finished Steel Co., National Steel Co., and Inland Iron & Forge Co.

The Atlas Engine Works, of Indianapolis, Ind., have made arrangements with MacBeth Bros. & Co., of Bombay and Calcutta, to be represented in that part of the world.

We have an inquiry for names of manufacturers of knurled or corrugated shafting for rollers of folding machines.

Waterbury & Co., incorporated under the laws of New Jersey, are a consolidation of the Waterbury Rope Co. and the Brooklyn Wire Co. The capital stock is $250,000 8 per cent preferred and $1000,000 common, in shares of $100 each. The company manufactures at its mills in Brooklyn, manila and sisal rope and binder twine and also wire and wire rope of all kinds. The combined companies in the last five years manufactured about 75,000,000 pounds of these products of a value of about $6,500,000. The average net profits for the last five years have been

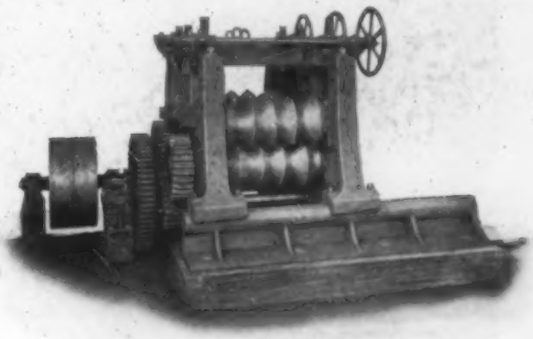


FIG. 3.—ANGLE STRAIGHTENING MACHINE.

over $149,000 per annum. The net profits for the year 1902 were $156,376. The company owns stock in the New York Steel & Wire Co. which cost $173,300 and which was acquired with a view of securing a supply of steel wire rods necessary for the business.

The Big Four R. R. has ordered 300 forty-ton flat cars built at its shops at Linndale, O., and has contracted for 1,000 forty-ton coal cars to be built at the Barney & Smith Works, Dayton, O.

Corrigan, McKinney & Co., Cleveland, owners of the Genesee blast furnace at Charlotte, N. Y., are making extensive improvements, including the building of two new stoves. The output of the furnace, which is now about 100 tons, will be doubled. These improvements are being made while the furnace is in blast, the old stove being used. When the building of the two new stoves is completed, the old stove will be razed to make room for a third new one. The new engine house has been completed and there are now three blowing engines in place of the one which formerly did service. Lake Superior ores are used.

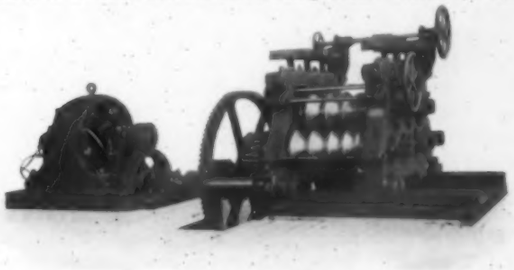


FIG. 4.—ANGLE STRAIGHTENING MACHINE.

A NEW STANDARD AND OPEN-SIDE PLANER.

In many shops there is a demand for the occasional use of an open-side planer but not enough to warrant the purchase of a machine made exclusively for that class of work; and a standard type of planer being much better for all-round work, the occasional open-side work is done with an extension tool at a great deal of trouble and expense. To supply this demand, the Mark Flather Planer Co., of Nashua, N. H., recently designed and put upon the market a combined standard and open-side planer. The cuts are made from photographs of the company's 42-inch standard planer changed to the open-side arrangement.

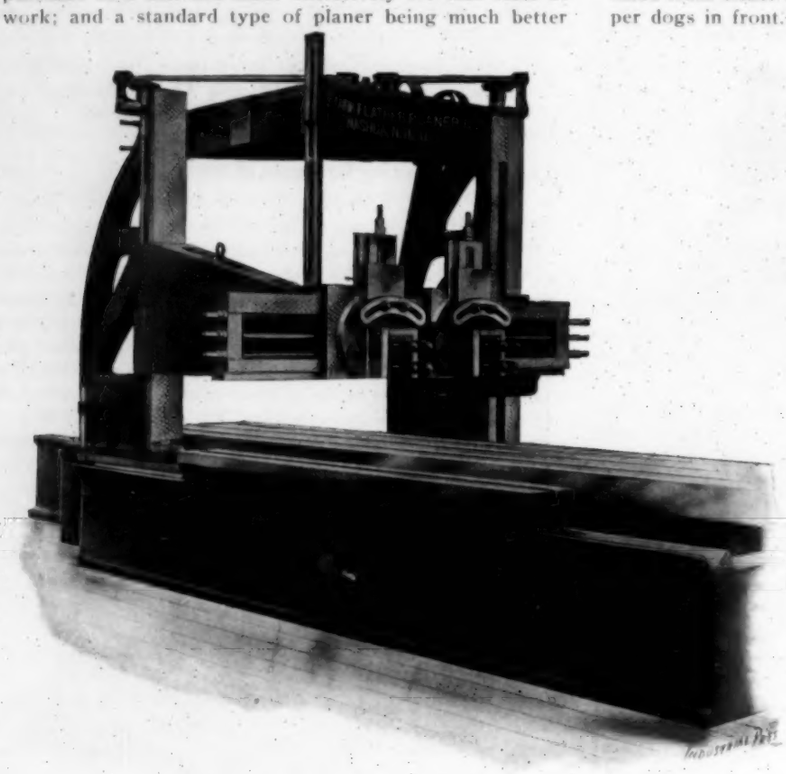


FIG. 1—COMBINATION STANDARD AND OPEN-SIDE PLANER.

As shown, the far housing can be moved back and extension piece placed between the crossrail and the face of the housing. In the planer shown, the distance from the point of the tool to the face of the housing is 63 inches, so that a piece 5 feet wide can be planed. The crossrail being the regular standard for the 42 inch planer, with two heads on the rail, is long enough to square down work 63 inches wide with the far head, and by setting the head at an angle several inches wider can be planed. A supplementary table to support the work, sliding easily in a V-way, scraped to a fit, gives a secure outer support to which work can be bolted. A rolling table can be furnished instead of the above, if preferred.

The far housing is tongued into the top of the bed, the cheek of which is made long enough to enable the housing to be moved back the required distance with a rack pinion, so that the extension can be put into position and bolted to the crossrail and housing, making a very rigid support for the rail. The face of the extension is made exactly like the face of the housing and is fastened to the rail by the same means as to the housing. The back part of the extension is made to fit over the two edges of the housing as well as to the face. The nut on the raising screw is disconnected from the rail and fastened to the extension and is made in such a way that the alignment of the rail is not changed by moving the housing. The rail is made to fit over the face and both edges of housings, and is extended above and below the regular width of the crossrail on the near housing. This gives greater bearing and support for the rail, so that when the far housing is removed the rail will still be held rigidly in position.

The change from a standard planer can be made in a very few minutes. The reversing mechanism can be operated from either side of the planer by hand and the shipper dogs in front. The power raising attachment for the crossrail, as shown in the cut, is driven by two friction pulleys, similar to those used on countershafts for lathes. The bevel pinion on this shaft drives a double bevel gear in a central position on the tie, which connects the two housings. The lower and larger one is driven by the pinion on the pulley shaft and the upper driving two cross shafts. One is rigidly connected with the near housing and the second one with the far housing, and both are made to swivel round the central driving gear and also on the raising screw on the far housing. The shaft also telescopes, through the bevel gear so that when moving the housing from one position to another the shaft is free to slide through the gear as it moves around the circle of the central gear. As these gears revolve around the central gear the relative positions of the raising screws are not changed. Bevel pinions revolve around the driving gear and also the bevel gear on the screw; consequently the position of the screws is not changed by the moving of the housing. The driving gears are all contained inside the bed, which is double webbed around the gears and makes a very stiff and powerful arrangement for driving the table. This arrangement is the same as is used on all the larger standard sizes of Flather planers at present and is much superior to the method used heretofore.

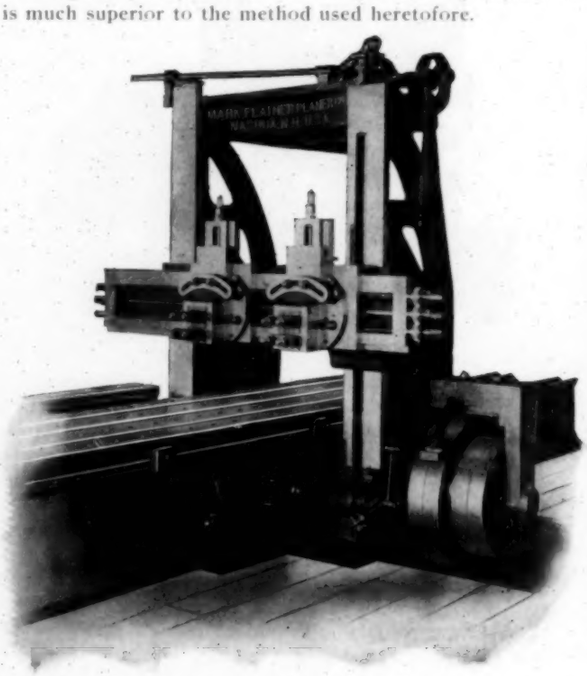


FIG. 2—SHOWING SIDE OF COMBINATION STANDARD AND OPEN-SIDE PLANER.

The feeding mechanism for the heads is driven by a new relief friction which has recently been brought out by the above company and is positive in its action in moving the feeds, but when released takes no power and does not

heat. The reversing motion provides for one belt doing its work, then leaving the pulley before the other starts, preventing the disagreeable squealing of belts. The machine is entirely under the control of the operator at any part of the stroke and there is no unpleasant jar or jerk when the machine is reversed.

ACCURATE PIECE RATE FIXING.

BY H. L. GANTT.

The statement was made at the last meeting of the American Society of Mechanical Engineers that "Rate fixing at best is only more or less a matter of educated guessing." Some years ago when the torsion balance first came into notice its accuracy as a weighing machine was described as so great that the ordinary knife edge balance was in comparison only a good guessing machine. If the author of the above statement about rate fixing had in mind any such comparison as this the writer is prepared to agree with him, but if he meant to intimate that the best methods of rate fixing to-day involve any large amount of guessing, as ordinarily understood, my reply is that he is not familiar with those best methods.

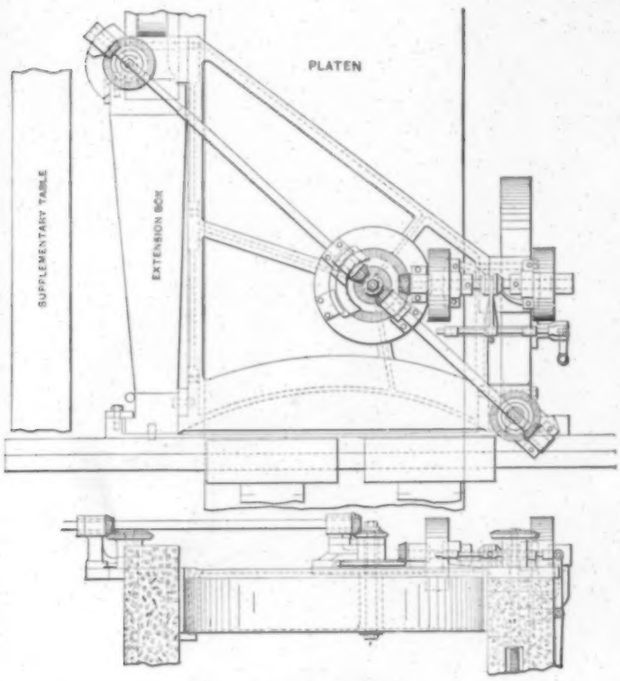


FIG. 3—DETAILS OF COMBINATION PLANER.

The fixing of the compensation for work done is one of the most important operations in modern manufacturing, yet it is one that has in general been given the least amount of systematic study. Most shops have expert financiers, expert designers, expert salesmen and expert purchasing agents, for everything except labor. The buying of labor is generally left to people whose special work is something else, with the result that it is usually done in a very unsatisfactory manner both to the purchaser and the seller. It is admitted to be the hardest problem we have to face in manufacturing today, and yet it is only considered when the manager "has time" or has to "take time" on account of the unsatisfactory state of affairs. The time to study this subject is not when labor trouble is brewing and every move either of the employer or workman is viewed with suspicion, but when things are running smoothly and when employer and workman have confidence in each other.

When compensation is fixed for doing a piece of work it should be for doing a definite piece of work with specified implements in a definite way. When the work to be done is accurately known and the implements provided, it is a matter of investigation to determine the amount that a good man should do, and I have yet to find a case in which a pretty accurate solution could not be gotten, if only the proper methods of investigation were followed and the subject given sufficient study. The difficulty is that few people are willing to give the subject the same amount of study that they would the design of a complicated piece of machinery, yet it involves more unknown quantities and is quite as difficult of solution. It requires a trained specialist just as much as the design of machinery does.

What a machine ought to do on a specific piece of work will, I think, be admitted to be a proper subject of scientific investigation; and the writer has seen enough to know that what a normal man can do and what a man and a machine can do are both in the same category.

I must emphasize the fact, however, that the problem is not an easy one and cannot be solved by men who are busy at something else and work at it only when they have time. Such problems must be studied by capable men who make the solution their main if not their whole business. In other words the rate fixing expert, if he is not to be a guesser, must be of the same order as the other experts. Then his department properly administered becomes quite as important and valuable as the older departments.

The fixing of a piece rate on the lines just considered consists then of two parts as follows:

1. A scientific investigation of the amount of labor needed to do the work.

2. A financial transaction consisting in the purchase of that labor for an equitable compensation.

Of the two the first is by far the more difficult, as it requires not only a knowledge of the modern methods of investigation, a large experience in doing work and an extensive acquaintance with appliances, but the ability to use that knowledge and those appliances to produce new and advantageous combinations. In other words, to obtain the highest type of success in this work a man must be able to devise the best method of doing a piece of work the appliances will admit of, and having determined this, to find the amount and quality of labor needed. This done, what remains is simply to buy this labor for an equitable compensation. I lay stress on the word equitable, for the fact that the most successful financial transactions are not those in which one side gets all the benefit but those that are beneficial alike to the buyer and seller, should eliminate at once the old fashioned method of rate fixing by which the foreman and the workman dicker about the price, the former trying to make it as low and the latter as high as possible, with but little regard to the actual amount of labor involved or the method of doing the work.

This process of bargining is still the standard in horse trading and like transactions, but is, to say the least, beneath the dignity of a million-dollar corporation whose continued success is dependent upon the prosperity of the country. The prosperity of the country is again dependent upon that of its seventy million inhabitants, and he who, knowingly or unknowingly, takes from the prosperity of one of these seventy million is taking just that much from the general prosperity. This is equally true whether the individual affected is rich or poor, for while some few rich men may use their wealth to the detriment of the country at large, the vast majority of them see clearly that their prosperity is bound up in the general prosperity, and do all they can to increase the general prosperity.

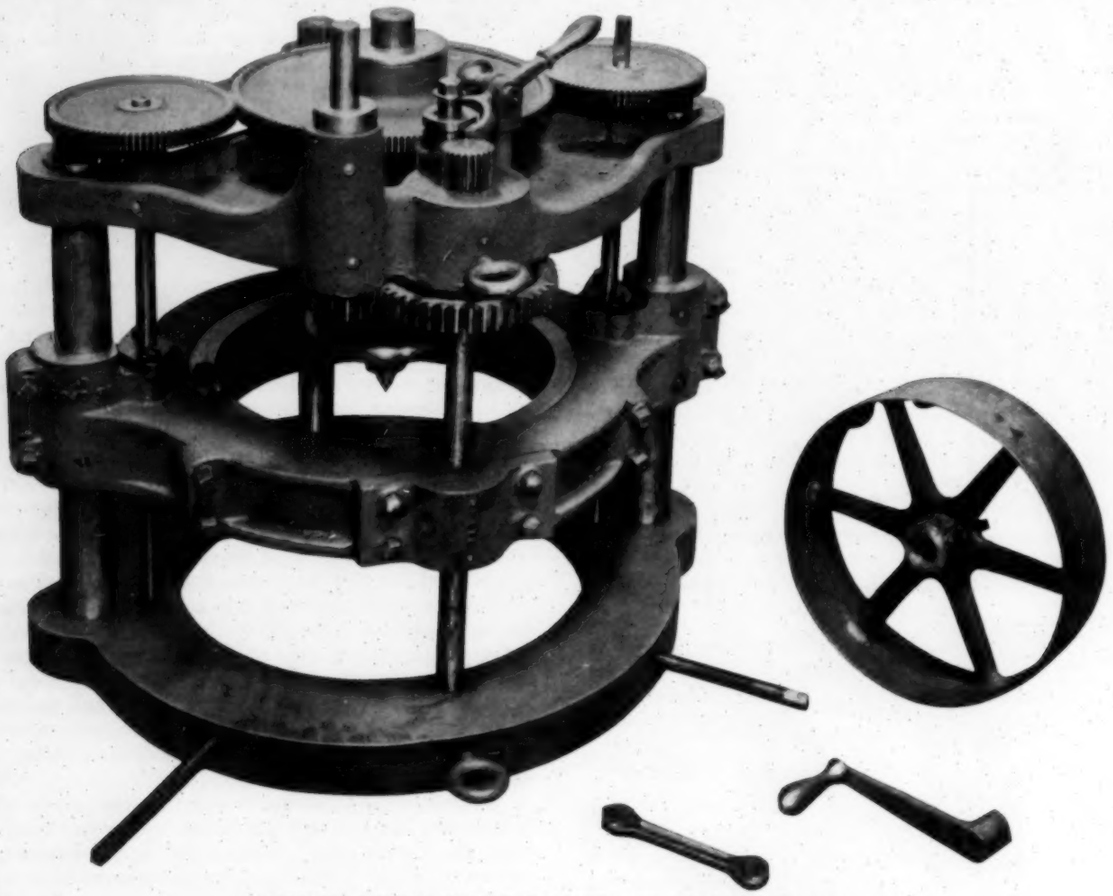
Joseph Bishop, of the Ohio State Board of Arbitration, has been trying to effect a settlement the past week, of the strike of machinists at the Stirling Co.'s boiler works, Barberton, O. The strikers went out on the refusal of their demand for the reinstatement of several machinists who were discharged for breaking rules laid down by the company.

The Rome charcoal furnace, of Rome, Ga., has been relined and has gone into operation again.

A MACHINE FOR TRUING CRANK PINS.

H. B. Underwood & Co., of Philadelphia, in connection with their line of portable tools have recently completed a machine for truing up crank pins in position. It is large enough to true up a crank pin 15 inches in diameter and 12 inches long. These large crank pins are usually made with a collar fastened to the pin by a large screw entering into the center of the pin. A rod and bushing is furnished to fit into the thread of the screw, the end of the rod projecting from the center of the outer end of the machine and being clamped there by the split hub. When, however, the pin is made without a screwed collar there is only a center left in it and for this class of pins the firm supplies an adjustable center in place of the rod already described. The machine is shown in the illustration.

Four adjusting screws in the crank end of the machine are employed for adjusting and supporting it while being secured by clamps and bolts to the crank. When it has been properly fastened the four bolts are backed out of the way of the cutting tool. The cotterhead carrying the tool is a steel forging with a gear cut in a portion of it to serve as a driving gear. This arrangement results in a powerful and suitable cutting speed. This cotterhead has an automatic feed along the entire travel, and two feed screws give the desired feed with the minimum amount of friction. The feed can also be easily handled by the crank for a hand feed while finishing out the fillets at the ends.



A PORTABLE TURNING MACHINE FOR TRUING UP 15-INCH CRANK PINS.

Eyebolts are furnished for handling the machine by crane or otherwise.The tool weighs about 950 pounds when ready for work and is strongly proportioned throughout. Smaller sizes are manufactured by the company. The 15-inch size is being built especially for steel mills and other plants having very large pins to true up.

The Birmingham, Eng., *Post* calls the attention of British manufacturers to the fact that contracts involving $65,000,000 have been obtained by American interests in the last few weeks for the construction of electric traction system in England, Russia and Holland. These contracts include the conversion of all of the horse tramways of St. Petersburg into electric roads, the construction of an underground railway and the erection of sixteen iron bridges across the Neva.

Convention of American Foundrymen's Association.

Secretary Moldenke of the American Foundrymen's Association, P. O. Box 432, New York City, announces the acceptance of the invitation of the Milwaukee foundrymen to hold the 1903 convention in that city. The dates fixed are June 9, 10 and 11. The secretary solicits short papers on foundry topics, which should be sent in as early as possible. The sections formed in the past year, one for chemists and metallurgists and the other for foundry foremen, will have their special discussions at the convention. There is also a demand for separate sections of pattern makers and foundry accountants. Members are therefore urged to send their foundry and pattern shop foremen and their chemists and chief clerks, so that the discussions in these lines may be made of the largest practical value and tend to the establishment of a greater uniformity in practice.

The exports of wrought pipe made by the National Tube Co., through Eastern ports last month aggregated 1,600 tons. The shipments went chiefly to Europe and the far East. Four hundred and sixty-eight tons were forwarded to England. Three hundred and ninety-five tons went to Antwerp. Other exports to Continental Europe in January were made to Greece, Germany and Italy. Three hundred and twenty-five tons went to China and Japan.

H. A. Hawgood, Cleveland, has closed a contract with the American Ship Building Co. for a steel steamer capable of carrying 6,200 tons of ore.

The Christensen Engineering Co's Plant.

The plant of the Christensen Engineering Co., Milwaukee, Wis., is of considerable interest, owing to the numerous applications of modern shop methods therein and to the remarkably rapid growth of the company. In 1896 the first air brake employing a motor driven air compressor, was applied to one of the cars of the Metropolitan West Side Elevated Ry. Co., in Chicago, and early in 1897 the Christensen Engineering Co. was organized to manufacture these air brake equipments for electric cars. The first operations were entirely successful, and other similar apparatus was soon installed in various parts of the country. The extent to which the authorities of electric railways have recognized the value of the Christensen motor driven compressor equipments is indicated by the fact that more than 95 per cent. of all the electric roads that have adopted air brakes of any kind are equipped with Christensen apparatus, and there are now over 7,500 of such outfits in service throughout the world.

The remarkable increase in the company's business necessitated a corresponding increase in manufacturing facilities. When first organized the company occupied a 30x70 corner of the Seamless Structural Co.'s plant. Additions to this space were made from time to time, until early in 1899 land was purchased near Riverside Park, Milwaukee, between the Chicago & Northwestern Ry., and the Milwaukee River. This site contains about 10 acres, and here is located the company's present plant, a general view of which is shown in Fig. 1. The buildings are constructed of brick, and combine the essential features that experience has proved to be of the greatest value in large industrial establishments. The equipment of machine tools, cranes, special machines, etc., is unusually extensive, modern and complete.

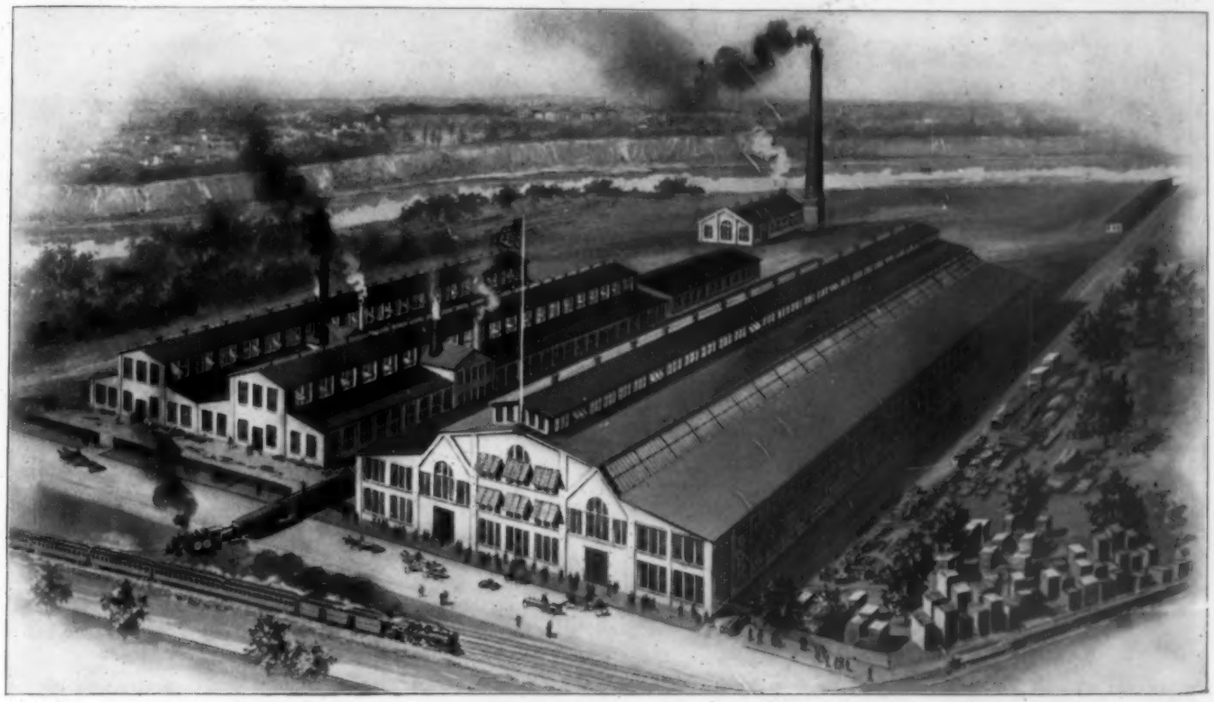


FIG. 1—CHRISTENSEN ENGINEERING CO.'S PLANT AT MILWAUKEE.

The original dimensions of the foundry, which was the first building of the present plant to be completed, and which was finished in the fall of 1899, were 100x146 feet, but this has recently been increased by an addition, 50x146 feet. The foundry interior is illustrated in Fig. 2, and a view of the crucible steel foundry, with 6 furnaces in the foreground, is shown in Fig. 3. The foundry equipment comprises an extensive adaptation of electrical apparatus in this class of service. The sand mills, tumbling barrels, emery grinders and blowers, are driven by individual, enclosed and dust proof motors, all built by the Christensen Engineering Co. Compressed air is freely employed to operate hammers, tamping tools, etc., in the foundry, and the same motive power is also used for the elevators, which convey metal and coke to the charging platforms of the cupolas. Another application of this force is in connection with the steel furnaces which are arranged for using oil fuel, this being fed to the furnaces by means of compressed air.

The main machine shop is 186 feet in width and the present length is 200 feet. A foundation has recently been completed for a 250 foot extension, which will make the total length 450 feet. This building is three stories high, the central portion being used for erecting purposes and for heavy machine tools. The several floors and other arrangements will be understood more clearly by reference to Figs. 4 and 5, which represent portions of the main shop and pattern shop respectively.

One of the lathe departments is illustrated in Fig. 6. A large number of the machines are driven by belts from small sections of line shafting on the well known "group" plan, each section being operated by an electric motor. The large machine tools are in most cases driven by independent motors, all these motors having been designed and built in the company's works.

A small room in the main building is equipped with such bandages and approved remedies for first aid to the injured as are likely to be occasionally needed in any manufacturing establishment.

The power house, like the other buildings, is an extremely well lighted and fire-proof structure. It is 60x125 feet. The equipment includes six 130 h. p., Babcock & Wilcox boilers, a 400-k. w. 250-volt, direct current generator, direct connected to an Allis cross compound Corliss engine; a horizontal automatic cut-off engine with a 90-k. w. direct current generator. There is a room at one end of the power house, 24x60 feet, where the engines and heaters of a hot air heating and ventilating plant are installed. A tunnel, 400 feet long, built of tile conducts the heated air to the machine shop and a return tunnel enables the blowers to obtain an air supply from the shop, sufficient fresh air being supplied from the leaks in windows, etc. The compressed air pipes, electric cables and steam pipes are laid in the return tunnel.

In order to manufacture the large number of motors required to operate the motor-driven air compressors, the company maintained an extensive equipment especially

suited to the purpose. It was thus but a step to commence the manufacture of larger sizes and other types, of electrical machinery. The company therefore decided some time ago to increase greatly its manufacturing facilities, and to develop a complete line of electrical machinery of high grade. This plan has been followed out, and a large number of generators and motors are now under construction. Although it is but a few months since the company began to sell electrical apparatus, the machines are already beginning to attain the reputation long been accorded to their air brake apparatus. Numerous extensions and improvements have been made and are being made, in order to supply the necessary facilities and handle the constantly increasing business. During the past few months several large machine tools and cranes have been installed, and the present equipment is sufficient to permit the manufacture of direct current generators up to 1000-k. w., and alternators up to 1500-k. w., capacity. As the principal products of the company are air compressors and electrical machinery it is natural that electric and compressed air appliances are used extensively throughout the works.

Work has been commenced on a three story office building, 66x200 feet. A warehouse, 50x200 feet, has also been planned and work on this structure will be started this spring.

The *Herald* of the City of Mexico, announces that the Monterey foundry and machine works have been acquired by an American syndicate, in which Enrique C. Creel is heavily interested.

The La Crosse Well Drill Works, La Crosse, Wis., which has been in operation about a year, has been very successful in manufacturing and selling well drilling tools, also all kinds of heavy iron work and heavy forgings. They also make a specialty of cranks, etc., for gasoline engines. The plant is in charge of Mr. M. P. Mahlum.

ENGLISH IMPRESSIONS OF CLEVELAND SHOPS.

A member of the party of English workingmen who recently visited Cleveland has written to the Leeds and Yorkshire *Mercury* his impressions of Cleveland plants. He says in part: "We visited first the shop of the Acme Machinery Co., an enterprise well known in England. The firm is 18 years old. We found the workshop equipped with the most modern tools the market affords, and with special tools of their own make for the manufacture of machinery in their own line. They do a good business in England, sending us altogether about 150 machines a year. We saw twelve machines ready for packing for consignment to Glasgow. The buildings were of glass and steel, well lighted and heated, and practically fireproof. Everywhere were signs of thorough organization. Two interesting machines which were pointed out to us were a nut-tapping machine and a bolt-cutter. Other machines we saw were a drilling machine with a 'reverse' for tapping, and all the handles and feeds within easy reach of the workman. This was a very fine machine, but not a great improvement on our own, except in its reversing gear. There was a tapping and boring machine similar to those in use in England, but it was run at a much greater pressure. There was no fear expressed as to its breaking, such as is found in English workshops. 'If it breaks we'll set up another,' said the foreman."

FIG. 2.—THE IRON FOUNDRY.

"Another Cleveland shop well known in England is that of the Brown Hoisting Machinery Co. This is the company which laid the Vickers plant at Barrow, and is at the present time engaged in a similar undertaking for Messrs. Harland & Wolff, Belfast. Their specialty is hoists and traveling cranes, and they have a world-wide trade in this sort of work. The firm is doing a good and constantly increasing business, a great deal of its output at present going to the Australian colonies.

"We saw the shop under a disadvantage, as reconstruction following the great fire two years ago was going on.

The machinery in use was fairly good. We saw a large wheel cutting machine for heavy work. It cost, with the necessary milling accessories, £1,000. It was automatic in feed and circular travel, and was attended to at intervals by a man who was working another machine. We could not ascertain exactly the hours worked by the workmen, but fifty-seven or fifty-eight a week would not be wide of the mark. Their pay was, on the average, $2.75 a day. The machinery was all American. In fact, we did not see a single English tool in any of the shops we visited that day.

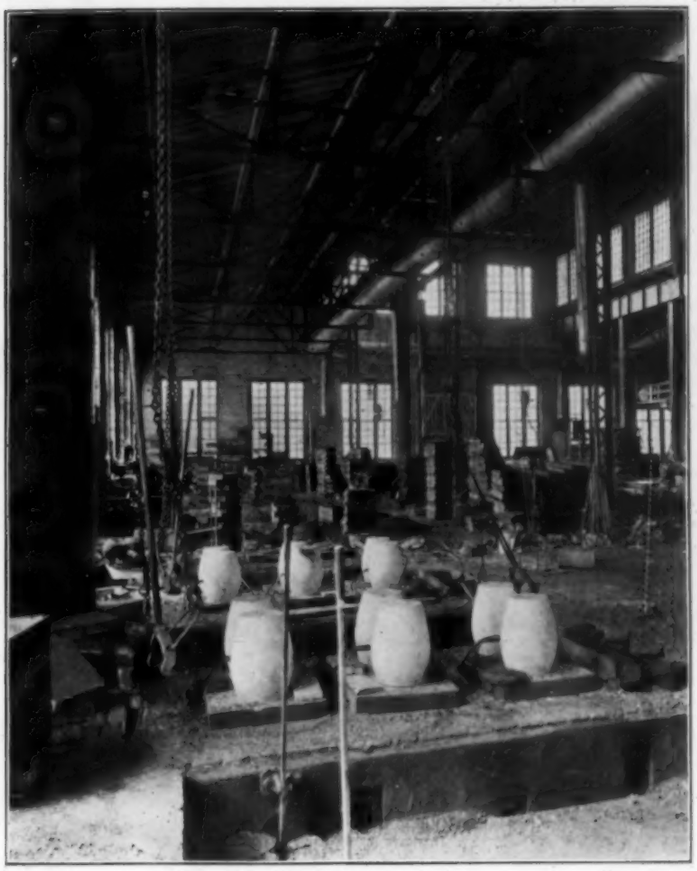


FIG. 3.—THE CRUCIBLE STEEL FOUNDRY.

"At Warner & Swasey's—the firm, I may mention, which turned out the great Lick telescope—we saw a turret-lathe, the distinctive features of which were the turret and hollow spindle. This lathe holds the material which passes through the hollow spindle fast at both ends, instead of at one, as is the case in England. This prevents the vibration. It is a splendid machine, coupling with these distinct advantages the best qualities of the English machine—heaviness, steadiness, and adaptability. The claims made on behalf of this machine are that it is of rigid construction, that the roller-feed can be operated whether or not the spindle is in motion, and that the automatic turret-feed can be quickly changed for each operation, as desired, by means of a handle conveniently located. This firm pays the best wages in Cleveland; machinists get thirty cents per hour, the hours being fifty-five a week. The Standard Tool Co. was one of the earliest manufacturers of twist drills.

"In the workshop of the Chicago Pneumatic Tool Co. we found the very best equipment, all the machinery being of the very latest and most approved pattern. The men were on perfectly free and easy terms with their manager, who was a Gloucester man. They worked fifty-four hours a week, and were paid from twenty-six to thirty cents an hour. There was no piece work.

"Cleveland has advanced farther than any other manufacturing center in the States in the direction of industrial betterment. The Chamber of Commerce of the city possesses a committee which has for its object the collecting of material regarding the improvement of working conditions all over the world, and of bringing the collected facts under the notice of Cleveland employers of labor. The result is that in Cleveland industrial betterment is more general and more highly developed than in any other city in the United States. The three companies who have ad-

FIG. 4—PORTION OF MAIN MACHINE SHOP.

vanced farthest in this direction are the Sherwin-Williams Paint & Varnish Co., the Cleveland Twist Drill Co. and the Cleveland Hardware Co."

The Jefferson Iron Co., Jefferson, Texas, which now has L. S. Colyar, president of the Rome Furnace Co., Rome, Ga., as manager, in relining its blast furnace and making improvements, which will make it virtually a new plant. A large supply of ore and wood for making charcoal is being collected. The furnace was built in 1891.

FIG. 5—THE PATTERN SHOP.

Among January engine sales of the Allis-Chalmers Co. are the following: St. Louis & Suburban Ry. Co., St. Louis, Mo., one 30 and 50x60 cross compound Reynolds Corliss engine, two 32x60 cylinders; Bethlehem Steel Co., So. Bethlehem, Pa., one 30x48 horizontal Reynolds Corliss engine; Gunther Foundry, Machine & Supply Co. (for Alamo Cement Works), San Antonio, Tex., one 20x42 girder frame horizontal Reynolds Corliss engine, with boiler and heater; William H. Patterson, Smithville, Mo., one 12x30 girder frame horizontal Reynolds Corliss engine, with boiler and heater; W. S. Tyler, Cleveland, O., one 22 and 36x42 vertical cross compound Reynolds Corliss engine; Maas, Blum & Co., New York City, one 12x36 girder frame horizontal Reynolds Corliss engine; Seeley, Son & Co., Fremont, Neb., one 22x42 horizontal Reynolds Corliss engine; E. H. Dyer & Co., Cleveland, O., two 10x30, two 14x36, and two 12x30 Reynolds Corliss engines; Georgia Iron & Coal Co., Chattanooga, Tenn., one 44 and 84x60 long crosshead blowing engine; United Engineering and Contracting Co. (for Imperial Hotel), New York, two 18x42 horizontal Reynolds Corliss engines.

The shops of the Holthoff Machinery Co., Cudahy, Wis., manufacturer of mining machinery, are running to their full capacity day and night on a number of large orders for Mexico and the West. The company started in business a little over a year ago, but already it has discovered that the capacity of its shops is not great enough to meet the demand for its machinery.

FIG. 6—A LATHE DEPARTMENT.

The Henderson Roller Bearing Mfg. Co., Toronto, Canada, has leased a building in order to meet growing demands of its business. The building is being equipped with latest machinery.

The Problem of the Smaller Manufacturers of Rods and Merchant Bars.

BY WILLIAM GARRETT.

An important question with many energetic men, who have for years been connected with the manufacture of iron and steel but whose services have been dispensed with, is this: If we again go into business, is it possible to get raw material and can we with limited output produce iron and steel and compete with the United States Steel Corporation? Having given the matter some study, I beg this opportunity to express my views on the subject.

Raw Material.

When the time comes that the United States Steel Corporation can buy up all the non-Bessemer ore in the West and Northwest and buy all of the pig iron made in the Valleys and elsewhere from blast furnaces not under their control; when they can get the entire monopoly and exclusive right of transporting material by water or land; get the exclusive right to use all men full of energy and skill—then they will become so powerful as to shut off all competition, become a menace to the business community and require measures by the public to control and suppress them. But when we think of the millions of tons of ore in sight that does not belong to the United States Steel Corporation and the hundreds of millions of tons not yet developed—assuming the ore at present in sight to be largely in a certain locality—it would only mean a change of base to manufacture iron and steel. But that the United States Steel Corporation have not control of all of the ore that can be delivered at the Lake ports, one has only to come to Cleveland to learn; for he will have no difficulty in making a contract for five or ten years at a price that would not by any means prohibit him from competing with and paying larger dividends than the steel corporation.

Do the United States Steel Corporation own all of the boats carrying ore? Do they have the exclusive right of sailing on the lakes? Can they buy and use all the pig iron made in furnaces other than their own, or can they stop progress or man's inventive genius? To all these questions sensible men must answer, No.

Semi-Finished Material on a High Level.

But it might be said: Can a man with a limited capital, assuming that he got his pig iron at a satisfactory price, compete with the steel corporation in making steel bars, for instance? The price asked for pig iron today is artificial, and not due to natural causes. It will not last for long, seeing the steel corporation will have several new blast furnaces in operation in the near future; and a great many outside parties will also be in shape to make pig iron. The present price of pig iron was brought about by the policy of the United States Steel Corporation, and was maintained by the purchase of pig iron by them from outside parties in 100,000-ton lots, which price, fictitious or otherwise, fixed the market for pig iron. Let your readers note the small margin between finished and intermediate material—sheets and sheet bars, bar steel and billets, between billets and rods—and were it not for foreign competition this margin would be even less. These prices as maintained work against the small manufacturers of sheets, bars and wire. The effect of this increase in cost of pig iron and scrap is to prevent others with a limited capital from investing their money in the open-hearth steel business or the Bessemer, to make their own billets or sheet or tin plate bars.

The Duquesne Plant as a Barrier.

Now, under all these unfavorable conditions, can a man of limited means start an enterprise to make—in this case we will say, finished steel bars, and compete with the United States Steel Corporation, both starting with pig iron and scrap? Can the small manufacturer of bars maintain himself, considering the vast amount of capital that has been expended by the Carnegie Steel Co. in particular to improve and cheapen the manufacture of merchant steel bars, as they have done at their Duquesne Works in the way of blooming mills, continuous roughing mill and also finishing mills, built regardless of cost to obtain the largest amount of output and also the largest dividend? These mills were illustrated in the Jan. 1 and Jan. 8 issues of *The Iron Trade Review* in a very elaborate manner. There was a 40-inch blooming mill driven by a 55x60-inch twin cylinder reversing engine, starting with an ingot 21½x18½ inches. On this 40-inch mill this ingot is rolled to 6x4, at which time the first end is cut off and passed into a 14-inch continuous roughing mill, where it is reduced to 1½ inches square if desired. This continuous mill is driven by a 78x60-inch compound condensing engine, in connection with which they have the Edwards flying shear and all the paraphernalia necessary to cut and take care of from 600 to 700 tons of billets per 12 hours, in the way of keeping them straight and loading them on cars. Then we come to the finishing mills, fitted up more generously than any other plant for that purpose, namely, that of making bar steel from ⅜-inch round and square up to 1½-inch round and square. In order to make the above mentioned sizes there are two mills required: one a 10-inch mill and the other a 13-inch mill. Billets from 1½-inch square to 4 inches square are used, depending on the size called for. Each mill is driven by an engine 30 and 54x48 inches. The hot bed is 450 feet long and most generously fitted up. An ordinary hot bed for a guide mill can be described as follows: Length of hot bed 75 feet, composed of rolled flat bars on edge placed in cast iron carriers with a boy at each end. However, those hot beds according to description are 450 feet long, have cone rollers, excapement racks, lifting wings, push bars, rocking shaft, adjustable gauge bar stop, skeleton pocket, etc.—truly very generously fitted up. These mills can average the year round, taking in the changing of rolls, 600 tons per 24 hours.

Assuming everything was accomplished as claimed, and that one of the main features of this mill is uniformity of size from end to end, and that these mills have nearly beaten the world's record as to output in a given time, seeing that the above plant to make steel bars, is so elaborate, and costs so large a sum of money, starting with the ingot, is it safe or wise for a small capitalist to embark in the business? Is there no way of making medium sizes of small merchant steel bars than by having such a large plant as described above? If so, why did the Republic Iron & Steel Co. go to such an expense and follow the same method, if it were not absolutely necessary?

A Merchant Mill for $200,000.

While it may be presumptuous on my part to differ from such high authority, let me for argument's sake assume that a capitalist wants a rolling mill plant to produce the same amount per 24 hours of merchant steel bars and covering the same range in sizes as covered by the two merchant mills located at Duquesne, and also to produce the same quantity, viz., 600 tons per 24 hours, beginning with an ingot. Say we start with a 6 or 7-inch ingot and roll the same in one heat to ½ inch round or square up to 3 inches round or square; flats from 1x¼-inch to 4x1-inch, and the mill as shown on the general plan here presented and marked No. 1, will produce 250 tons per 24 hours. This mill will not cost more than $200,000 complete. Now we have a mill that will cost $200,000, and one which will produce merchant bars not only covering the same range but beyond the range of the two mills at Duquesne, so far as the diversity of sizes is concerned. One mill of this type will produce 250 tons in 24 hours, and if they were to receive orders same as at Duquesne, viz., sometimes ¾ inch round in 2,000-ton lots (output being governed by the least changing of rolls or

sizes on no matter what kind of a mill) three mills of this type (each to produce 250 tons) will produce 750 tons in 24 hours. Each plant will consist of one or two Laughlin continuous heating furnaces, an 18-inch train with two stands of rolls, in front of the second set, another set is placed tandem and here the action of the bar is continuous. Then there is a 12-inch train consisting of five sets in line and three sets placed tandem in front of the first set. Hence the first four sets on the finishing train are continuous. In this mill all new experimental ideas have been avoided and it might truly be termed "The Unscientific Merchant Bar Mill." In front of the first set of the 18-inch mill are lifting tables of the same type used on all three-high blooming mills and the idea of transferring from the first to the second set on this train is old and in general use. In six passes the 6-inch ingot is reduced to 2¾ inch square, then transferred to the second set, where it is reduced to 1¾ inch square in two passes; and since these two passes are tandem the process is continuous and delivers the bar towards a shear which lies between the 18-inch trains. When rolling ½ inch and ⅝ inch round this bar may be sawed into two parts seeing that the hot bed is only 200 feet long. All sizes ¾ inch round and above can be rolled from the entire ingot and some larger sizes could take a larger and heavier ingot than a 6-inch weighing 300 pounds, which might be desirable to use.

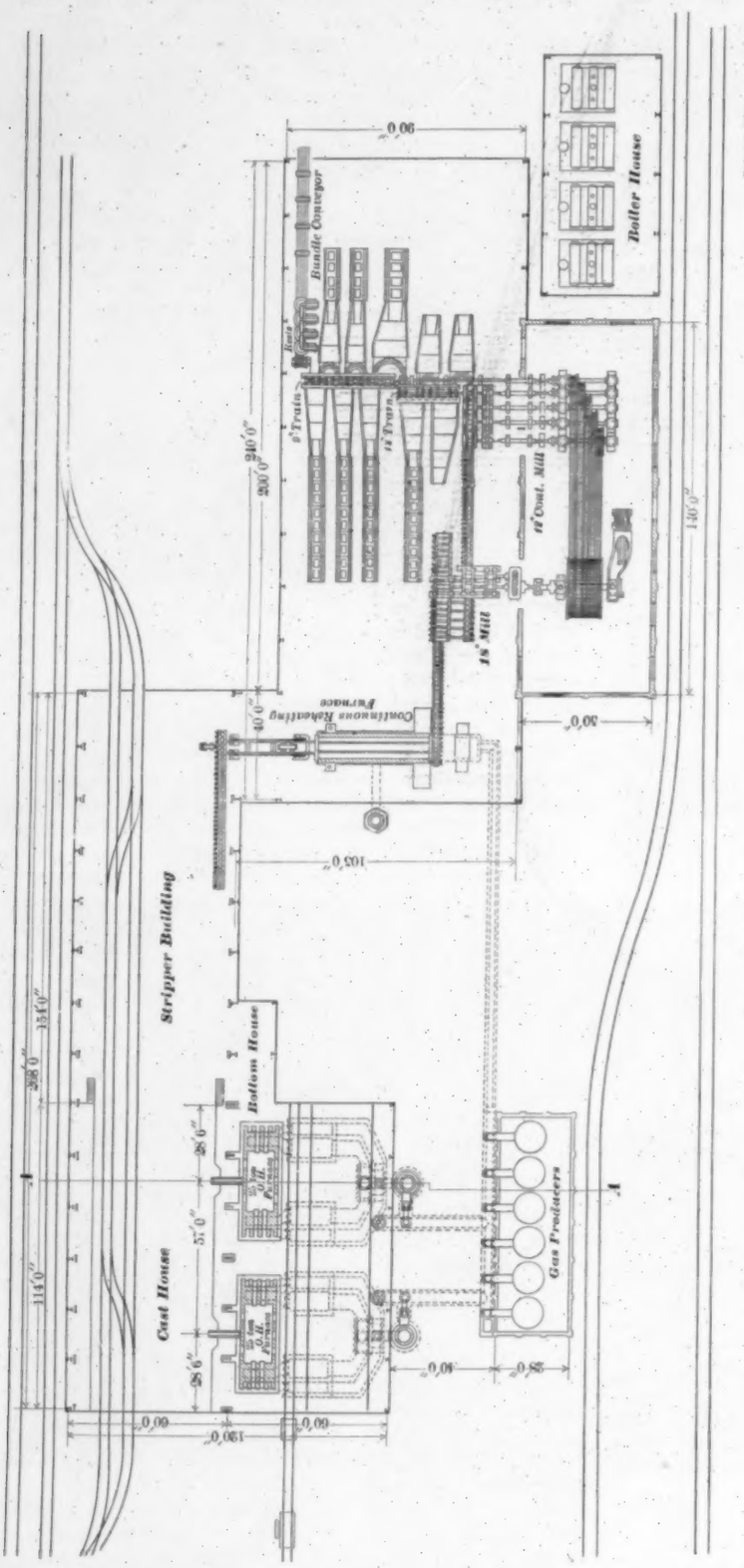


FIG. 1.—PROPOSED PLAN OF OPEN-HEARTH STEEL PLANT AND ROD MILL.

Working Force and Labor Cost.

The number of men required to operate this mill to reduce a 6-inch ingot to, say, ¾ inch round is less than the number required on the Duquesne mills. On this mill they are as follows: One man to operate the tables on the 18-inch train where the 6-inch ingot is reduced to 1¾ inch square; one man at the shears; three men on the 12-inch mill on the ovel side; on the other side of the repeaters no men are required, and four men straightening the bars on an "unscientific straightening bed." True, when rolling flats and angles you might require more men around the mill, which will be figured in the following cost sheet; but then labor cuts such a small item in the cost that a man more or less does not make much difference. The following is a detailed statement showing the number of men required to operate this mill to produce 125 gross tons per turn of 12 hours, beginning with the ingot delivered at the furnace and using two heating furnaces:

1 Heater	$7.00
3 Heater's helpers ($2.50 each)	7.50
1 Pusher in	1.50
2 Men at Producers ($2.00 each)	4.00
Labor heating	$20.00
1 Roller	$12.00
1 Roller's helper	4.00
5 Strand men ($2.50 each)	12.50
1 Man at shear, 12-inch mill	2.00
4 Straighteners ($1.75 each)	7.00
2 Men to operate tables at 18-inch mill ($2.50 each)	5.00
1 Boss shear man	3.00
5 Men to shear and load finished bars ($1.75 each)	8.75
Labor rolling	$54.25
1 Engineer	$3.00
3 Firemen ($1.75 each)	5.25
1 Ash-wheeler	1.50
6 Common laborers for unloading coal and general work ($1.50) each	9.00
Engine, boiler and common labor	$18.75
1 Boss roll turner	$5.00
1 Roll turner's helper	2.50
1 Master mechanic	5.00
1 Blacksmith	4.00
1 Blacksmith's helper	2.00
Labor for double turn	$18.50
Labor for single turn	$9.25
1 Machinist	2.75
Labor for maintenance	$12.00

SUMMARY.

Labor heating	$20.00
Labor rolling	54.25
Labor engine, boiler and common labor	18.75
Labor for maintenance	12.00
Average for 125 tons	$105.00
or 84 cents per ton for all labor required.	
Coal for heating, 200 pounds at $1.75 per ton	$ .175
Coal for steam, 600 pounds at $1.75 per ton	.525
Loss in heating, 2 percent at $30	.60
Loss in crop ends, 6 percent at $30 equals $1.80, and crediting ½ for scrap	.90
Material, wear and tear, including rolls, etc.	.50
Total labor	.84
Total cost per ton of manufacturing from the ingot delivered at furnace to finished material placed on cars	$3.540

To this should, of course, be added the cost of the office of the management and sales department. However, be that as it may, the idea at the present time is to show the merits of the two types of mill; and it must be borne in mind that the above only represents one unit of three to make the capacity equal to the two Duquesne mills; and as there would be one superintendent and one office, one sales department and two blacksmiths instead of three, if the three mills were required to give the same capacity as the two at Duquesne, the cost of management, etc., would be less.

Seeing the cost of manufacture at Duquesne was not included in the description given in your issue a comparison cannot be drawn. But a comparison can clearly be drawn as to the merits and cost of the two plants. In the first an 18x22-inch ingot is used which is reduced on a 40-inch mill to 4x6 inches. Then this 4x6-inch ingot is reduced on a continuous mill to about 1¾-inch square. This 1¾-inch square is taken and reheated in two of the most modern type of merchant mills, most "generously equipped," where the merchant bars are being made—this including the 400-foot hot bed devised and constructed on the most scientific principles. In the second a 6-inch ingot is used, which is heated and folled direct without reheating into finished material. Upon this basis, let us see: first, the difference in the cost of the plants; second, the difference in the cost of production, and see if the excessive cost of the one plant over the other is justified. If so, the small manufacturer must give up business; if not, the statement may be the means of stimulating small capitalists to embark in the steel business and tend in the end to create a formidable competitor to the United States Steel Corporation.

Cost of Steel Plant and Finishing Mills.

In order to obtain results such as at Duquesne, starting with an 18x22-inch ingot, you must have a blooming mill, perhaps not so expensive as the 40-inch reversing mill they have, which cost over $500,000, but at least one which would cost $400,000. If the most modern blooming mill were put in it would reduce this 18x22-ingot to 4x6 inches. Then they have a continuous billet mill driven by an engine having 5,000-horsepower; a flying shear; an automatic scientific cooling bed, with crane commanding same, etc., which cost at least $400,000. Then the two finishing mills, one a 13-inch and the other a 10-inch, each with it 470-foot hot bed. These, with the steam power, but without buildings, cost over $800,000, and it is safe to add $100,000 extra for the entire buildings, which would make a total of $900,000, as below:

Blooming Mill	$400,000
Continuous Mill	400,000
Two Finishing Mills	900,000
	$1,700,000

It may be said here that the above plant can produce more than twice the quantity required by the two finishing mills. True. But in order to get the efficiency obtained such a plant would be absolutely necessary, even if 600 tons per day was all that could be sold, and a man with limited capital, wanting to make merchant bars only, would be placed in an unfortunate position were it absolutely necessary, to obtain economical results, for him to put up a blooming mill and continuous billet mill of double the capacity of his finishing trains; and in order to do this, go to the extra expenditure (which I have not taken any account of) to make the necessary quantity of steel ingots

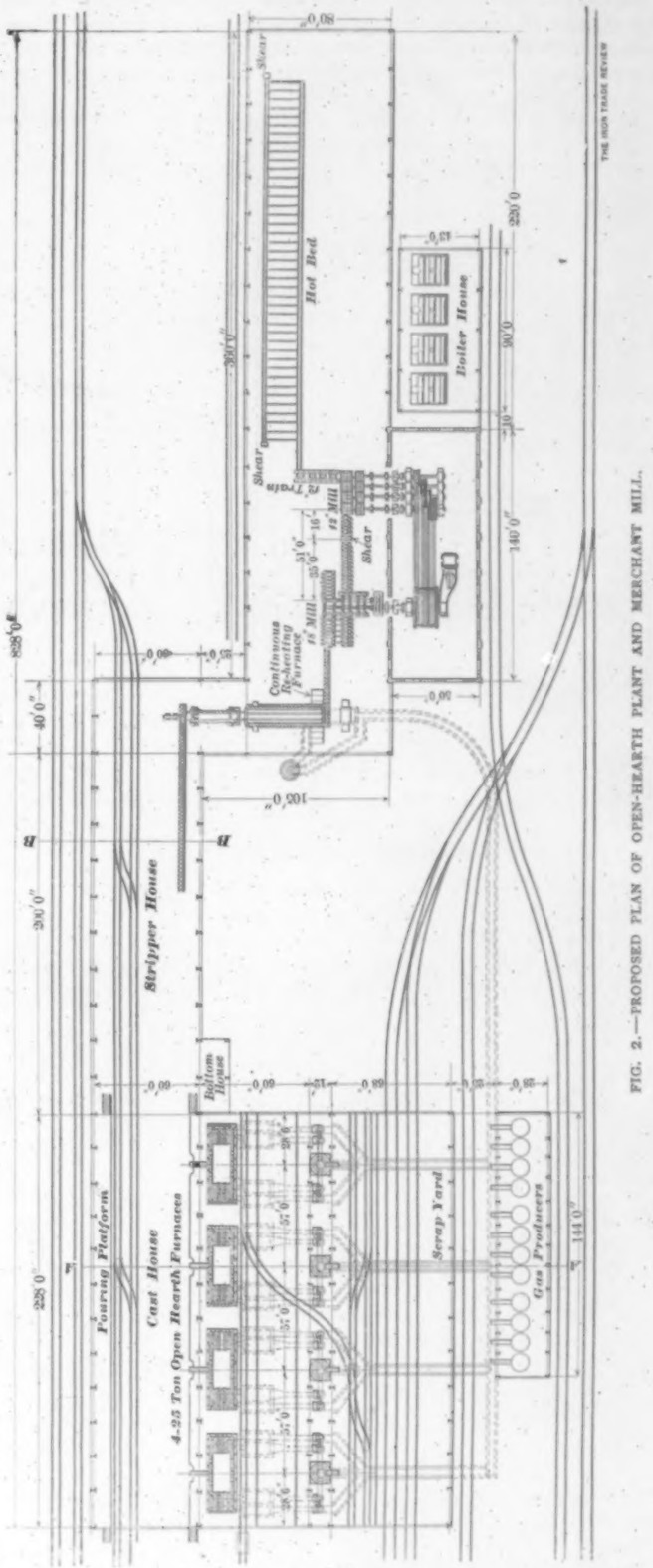


FIG. 2.—PROPOSED PLAN OF OPEN-HEARTH PLANT AND MERCHANT MILL.

to keep the blooming mill and continuous mill fully employed. On the other hand, with the information already given for a plant which will duplicate in quantity and sizes those two modern merchant mills at Duquesne, the cost is as follows:

Three merchant mills, as per drawing, at $200,000 each, $600,000, or $1,100,000 less. But is may be truthfully said that the cost of a small ingot 6x6 is considerably greater than an 18x22-inch ingot. Granting that; but this large ingot has to be re-heated and rolled into a billet in one or two processes as the case may be, and the cast of the small ingot should stand in the same relation as the cost of the billet.

A Small Ingot to Start With.

Generally speaking, it costs about $1.20 to convert a 5,000-lb. ingot to a 4-inch billet; then about 60 cents per ton to convert this to a small billet on a continuous mill. So there is $1.80 per ton margin left to apply on the extra cost of making the small ingot. This will go a great way to help pay for the extra loss in bottom pouring (owing to the runners) and the extra labor in making the small ingot.

If the above surmises are correct, we have a small ingot that costs almost the same as a billet. A plant consisting of a blooming mill starting with an ingot, a continuous billet mill and two finishing mills of the Morgan type, will cost in the neighborhood of $1,700,000; whereas three mills as per drawing, starting with a 6x6-inch ingot will give the same if not greater capacity, and will cost all told $600,000, a saving of $1,100,000. If we take this $1,100,000 and invest it at 5 per cent you have $55,000 per year, and $55,000 divided by 150,000 tons per year means 36 6-10 cents per ton, which you could add to the cost of the ingot, to make matters equal—this not figuring the extra wear and tear, depreciation in value, etc. This, of course, assumes that a blooming mill, continuous billet mill, and Morgan type of finishing mills are absolutely necessary to make merchant bars economically. Certainly a 20x18-inch ingot cannot be reduced to 6x4-inch without a blooming mill; nor can a 6x4-inch from the entire ingot be reduced to 1½-inch square without a continuous mill. Neither can a 30-foot billet be reduced to finished bars without the Morgan type of finishing mills and hot bed.

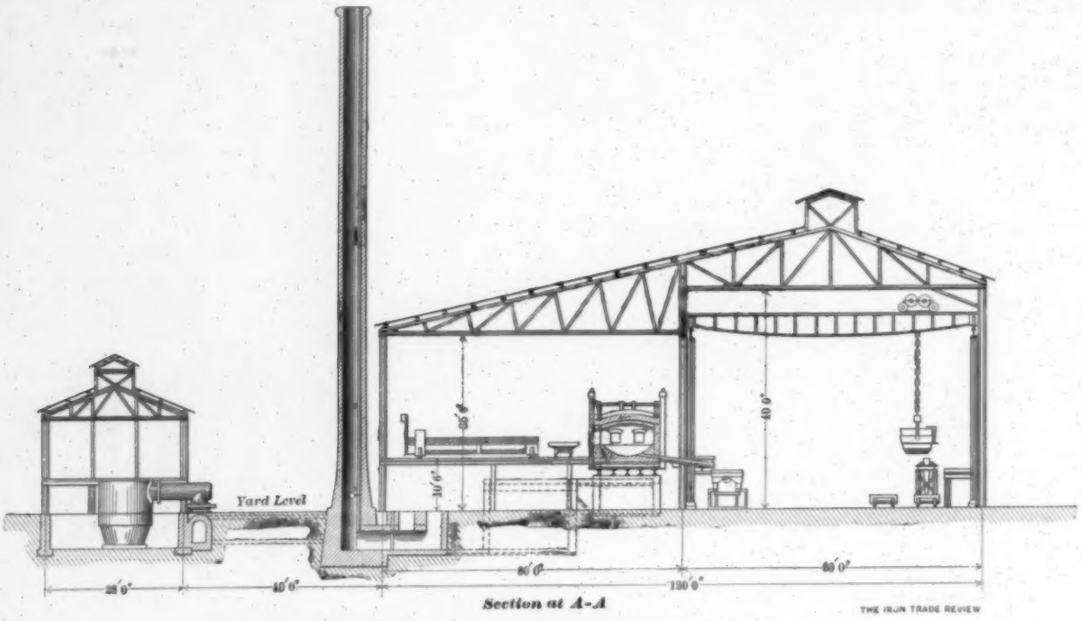


FIG. 3.—SECTIONAL VIEW OF STEEL PLANT SHOWN IN FIG. 1.

Summation.

Let us summarize as per the above:

First. A plant necessary to produce 600 tons per 24 hours of finished merchant steel, such as produced at the present time at the Duquesne Works of the Carnegie Steel Co., which plant comprises a 40-inch blooming mill, a continuous Morgan billet mill, two Morgan merchant mills, which in the aggregate cost $1,700,000; and the same is accomplished with an expenditure of not over $600,000, against $1,700,000.

Second. Does the amount saved in the cost of production of merchant steel bars on the Morgan and Duquesne method warrant the extra expenditure of $1,100,000?

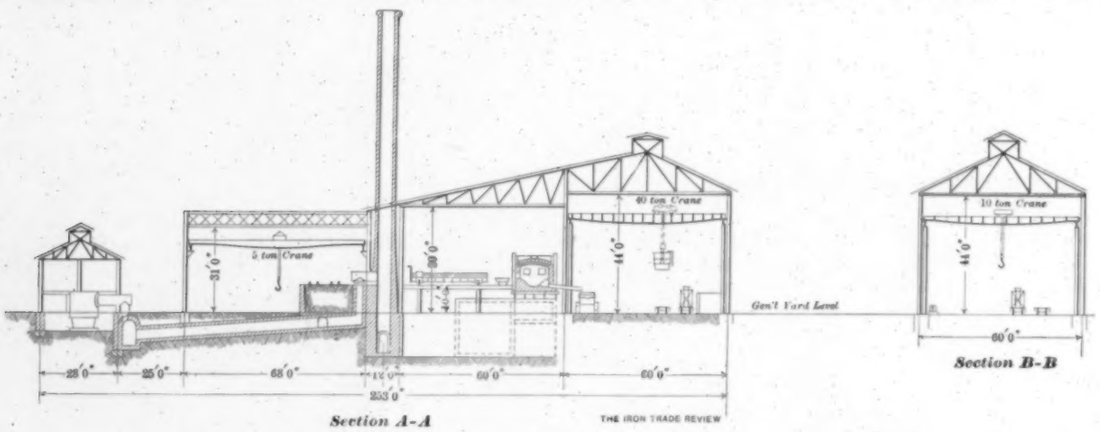


FIG. 4.—SECTIONAL VIEW OF STEEL PLANT AND MERCHANT MILL SHOWN IN FIG. 2.

Third. Considering that we have to add whatever saving there may or may not be, starting with a samll ingot, there still is $8 to $10 per ton above the actual cost of manufacture which the United States Steel Corporation have to make before they can pay interest on bonds, etc., owing to the excessive watering of their stocks, which condition gives the small or medium sized capitalist an extra inducement to embark in the merchant steel business and make a good investment and compete with the steel trust.

Fourth. If a 6x6-inch or a 8x8-inch ingot became a new article of commerce, such as a 4-inch billet became after the advent of the "Garrett" rod mill—prior to which time a 4-inch billet cost at least $5 per ton more than a 7-inch bloom, while today it is selling at the same price—is it not fair to assume a small ingot could be made much cheaper if the demand for same was as great as for a 4-inch billet at the present time?

Fifth. When it is a well known fact that the larger the ingot the more segregation is apt to take place, and that in many cases one-third of the top end of the ingot is unfit for purposes such as axles, tin plate, steel rounds for making chains, and also for rails, is this not a sign that the size of the ingot has gone beyond the point to give the best results, and an argument in favor of the use of smaller ingots?

Sixth. Seeing that all the steel casting plants of the country—about 75 in all—can only use their steel melting capacity one-half of the 24 hours, because casting and molding is only done by day, could they not make the other half of their capacity into small ingots for general sale, if such became an article of commerce, and there was a demand for same? As a matter of fact, there are indications that in the near future a steel casting plant will have a mill to roll merchant steel, starting with a small ingot, connected so as to take advantage of the above, having two basic furnaces additional to their steel casting plant; then the scrap from crop ends, etc., will be useful and valuable as low phosphorus scrap for their acid steel casting furnace.

While having dwelt principally on the question of merchant bars—general plan of mill shown in Fig. 1—still a mill built on lines of Fig. 2 could roll No. 5 wire rods direct at one heat from a 7x7-inch ingot weighing 600 lbs. Fig. 5 shows one roughing and blooming mill to two finishing bar trains, whereby you could always be rolling on one mill or the other while changing rolls.

In conclusion, it is practical to roll as small an ingot, say, as 6x6 into finished material, and will the quality be as satisfactory as product made from a 20x20-inch ingot? In reply I will say that in Germany, it is almost common practice to roll wire rods from such an ingot, and even in Canada this plan is getting into use. In regard to quality, a ⅝-inch or ¾-inch round bar has more work on it, starting with a 6-inch ingot and rolling same direct without re-heating, than on the same size bars starting with a 2-inch square billet. As to quality, one of the greatest troubles the steel maker has is the segregation of impurities, which takes place when making a large size ingot. This is so well known that further explanation is unnecessary. So the only objection to using a small ingot is the cost of making such a small ingot in comparison to the cost of making a 2-inch billet or even a 4-inch square billet.

I have endeavored to make this matter as clear as I can, so that even he who runs may read. If in error, it is in order for the "scientific engineer" to correct his "unscientific" brother.

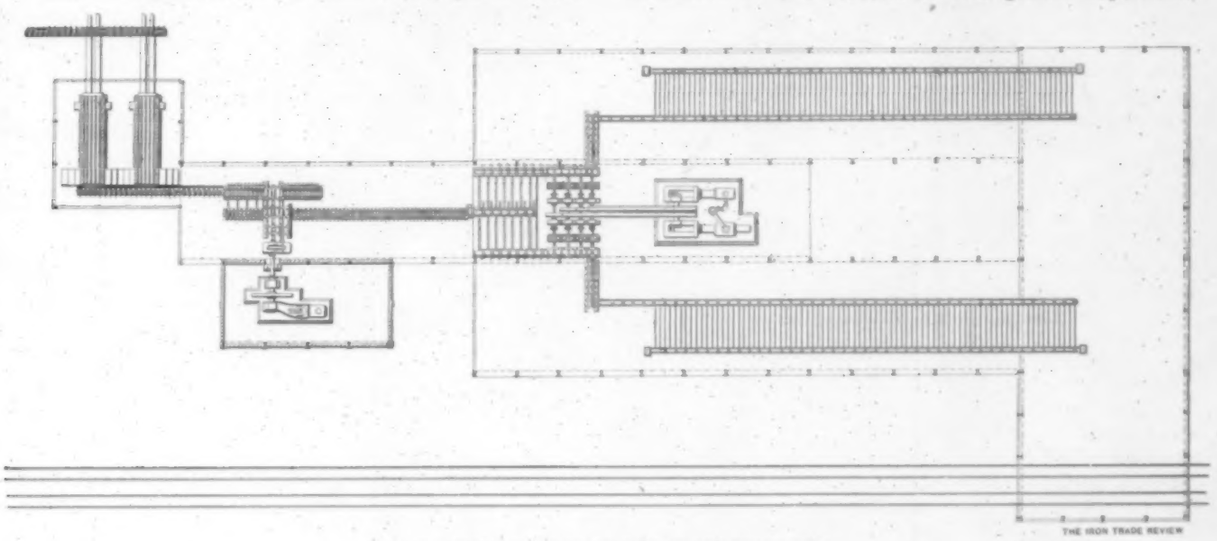


FIG. 5.—PROPOSED PLAN OF DOUBLE MERCHANT MILL.

SPEEDS FOR FLY WHEELS.

The *Monthly Bulletin* issued by the Fidelity & Casualty Co. of New York has had a number of very interesting paragraphs prepared by Wm. H. Boehm, the mechanical engineer in charge of the flywheel department of that company. Several typographical errors unfortunately marred the initial appearance of the data, however, and Mr. Boehm has kindly corrected these and put the matter into useful shape. The subject is of vital interest to manufacturers and becomes of even greater importance, with increasing size and speeds—a natural tendency indeed with concentration of high powered units and modern velocities. The article presents the subject stripped of technicalities and in easily available form and is of corresponding service to the crowded man of affairs:

It is a well understood fact that while an engine pulley or fly-wheel can be designed to successfully resist the torsional stresses due to any load required of the engine, there is no possible way to overcome the centrifugal force due to speed.

For a given material there is a definite speed at which disruption will occur, regardless of the amount of material used. This is not an uncertain theory but a mathematical truth easily demonstrated, and is expressed by the following formula:

$$V = 1.6\sqrt{\frac{S}{W}}$$

in which V is the velocity of the rim of the wheel in feet per second at which disruption will occur, W the weight of a cubic inch of the material used, and S the tensible strength of one square inch of the material. In words the formula means that if we divide the tensile strength of the material by its weight per cubic inch, extract the square root of the quotient and then multiply this by 1.6 the result will be the rim speed in feet per second at which disruption will occur.

If instead of the ultimate strength of the material we take its safe strength, the result will be the rim speed in feet per second at which the wheel may be run with safety; the supposition so far being, however, that the rim is made solid in one piece, of homogeneous material, and free from shrinkage strains.

Applying the formula to determine the safe rim speed for cast iron wheels made in one piece, we would assume that, if the ultimate strength of small test bars were 20,000 pounds per square inch, we could depend upon having 10,000 pounds in large castings.

Using a factor of safety of 10 on this would give 1,000 pounds per square inch as the safe strength of this material. The weight of a cubic inch of cast iron is approximately .26 of a pound, so that we have for cast iron wheels:

$$V=1.6\sqrt{\frac{S}{W}}=1.6\sqrt{\frac{1,000}{.26}}=100 \text{ feet.}$$

per second.

So that 100 feet per second may be regarded as a safe rim speed for cast iron wheels made in one piece. This corresponds to about 1.15 miles per minute, but as such wheels are likely to contain shrinkage strains it is not considered good practice to run them faster than a mile a minute.

If the wheel is made in halves, or sections, the efficiency of the rim joint must be taken into consideration. For belt wheels with flanged and bolted rim joints located between the arm, the joints average only one-fifth the strength of the rim, and no such joint can be designed having a strength greater than one-fourth the strength of the rim. If the rim is thick enough to allow the joint to be reinforced by steel links shrunk on, as in heavy balance wheels, one-third the strength of the rim may be secured in the joint; but this construction cannot be applied to belt wheels having thin rims.

Applying the formula to wheels made of cast steel having an ultimate strength of 60,000 pounds per square inch, or a safe strength of 6,000 pounds per square inch, and weighing .28 of a pound per square inch, we have

$$V=1.6\sqrt{\frac{S}{W}}=1.6\sqrt{\frac{6,000}{.28}}=233 \text{ feet.}$$

per second.

So that a cast steel wheel made in one piece and free from shrinkage strains could be run with perfect safety at a rim speed of 233 feet per second, corresponding to 2.6 miles per minute.

It will perhaps surprise some of my readers to learn that wheels made of wood may be run at a higher speed than those made of cast iron. Wood, however, is one of the very best materials that can be used for fly-wheel construction, and many large wheels have been constructed of this material and are giving satisfactory results.

Applying the formula to hard maple having a tensile strength of 10,500 pounds per square inch, and weighing .0283 of a pound per cubic inch, we have, using a factor of safety of 20, and remembering that the strength is reduced one-half because the rim is built up of segments,

$$V=1.6\sqrt{\frac{S}{W}}=1.6\sqrt{\frac{262.5}{.0283}}=154 \text{ feet.}$$

per second.

So that a well made maple wheel may be run with perfect safety at a rim speed of 154 feet per second, which corresponds to 1.75 miles per minute. Or comparing two wheels of the same diameter, one of cast iron, the other of maple, the number of revolutions per minute for the maple wheel may be 54 percent greater than for the cast iron wheel. One hundred and fifty-four for the wheel if made in halves or sections, on account of the weakness of rim joints.

Of late years, wheels for large electric plants have been built up of steel plates riveted together, and wheels for special work or unusually high speed have been specially designed. It is questionable, however, whether the complicated built-up steel construction is profitable for wheels of standard steam engines as commercially built. When an engine gets going fast enough to burst a well-made cast iron wheel it is doubtful whether anything could save it. The small amount of time required for the additional acceleration necessary to burst a steel wheel at that stage would be little, and when the crash did come, it would be all the more disastrous.

I have pointed out that "for a given material there is a definite speed at which disruption will occur regardless of the amount of material used, and gave the formula

$$V=1.6\sqrt{\frac{S}{W}}$$

from which any engineer can readily determine for himself whether or not the fly-wheel on his engine is running at a dangerous speed.

If now we square both sides of this equation and solve for S, we obtain the formula

$$S=\frac{WV^2}{2.56}$$

from which the stress tending to burst the rim asunder may be obtained for a wheel made of any material and running at any speed.

Stated in words, the formula means that if we multiply the square of the velocity of the rim in feet per second, by the weight in pounds of one cubic inch of the material in the wheel, and then divide the product by 2.56, the result will be the force in pounds per square inch tending to burst the wheel. Bending stresses have been neglected in order to simplify the formula.

As a cubic inch of cast iron weighs about .26 of a pound, this gives for cast iron wheels

$$S=\frac{V^2}{10} \text{ approximately.}$$

That is, the stress tending to burst the rim of a cast iron wheel is one-tenth of the square of the velocity of the rim in feet per second.

From either of these formulae it is seen at a glance that the stress in the rim of a wheel increases with the square of the speed, or, to put it in another way, the factor of safety on speed is always the square root of the factor of safety on strength.

If the speed be tripled, for example, the stress in the rim becomes nine times as great as before; that is, with a factor of safety of nine on strength, there is a factor of safety of only three on speed. It will be understood from this that the stress increases enormously for even a slight increase in speed.

Let us consider the usual cast iron, sectional, belt-wheel having flanged and bolted rim-joints located between the arms. Such joints average a strength of only one-fifth the strength of the rim, and no joint of this kind can be designed that will have a strength greater than one-fourth the strength of the rim.

If this wheel had at normal speed a factor of safety of 12 in the rim, then with joints of maximum strength the factor of safety in the joint would be only 3 on strength or 1.73 on speed. That is, an increase in speed of 73 percent would burst the wheel.

The wide gulf in this case between the apparent factor of safety of 12 on strength and the real factor of safety of 1.73 on speed is appalling. This is, however, only another warning that things are not always as they seem.

As a matter of fact, few wheels have a margin of safety of 73 percent on speed. In the accident at the Amoskeag Mills, in which a 30-foot wheel badly wrecked the building, killed two girls and badly injured the assistant engineer, the evidence proved that an increase in speed of only 20 percent caused the disaster. Many wheels in use to-day are running on a narrower margin than this.

It will now be understood why racing is so frequent a cause of fly-wheel accidents. Some slight accident to the governor or valve gear of the engine occurs, and away goes the wheel, causing a costly if not fatal wreck. The stress in the rim increases so rapidly with increase of speed that sound wheels, amply safe at normal speed, go to pieces without warning, and apparently without cause.

An interesting feature of such accidents is that fre-

quently the engineer is found dead at his post and the throttle valve closed. I leave the explanation of this to my engineer friends.

Methods that shorten the labor of computation are welcomed alike by the busy engineer and the hustling office man. Short cut rules are sought not only to save time but also to miminize the chances of error.

I have given a rule for computing the rim speed of fly-wheels and now give a handy rule for computing the maximum allowable speed for cast iron wheels on any given diameter and number of revolutions. The rule is based upon the current practice of allowing a rim speed of one mile per minute for well made cast iron wheels and so does not take into consideration the difference in strength between solid and sectional wheels. The rule gives very accurately the number of revolutions per minute at which the mile per minute danger point is reached. So far as I know the method is new and is as follows:

Rule: To compute the maximum allowable number of revolutions per minute for a well made cast iron wheel 16 the diameter in feet. Divide the number 1680 by the diameter. This is expressed in the form of a formula as follows: Maximum revolutions per minute $=\frac{1680}{D}$

Example: What is the maximum allowable number of revolutions per minute for a well made iron wheel 16 feet in diameter? Here we have maximum revolutions per minute $=\frac{1680}{16}=105$. That is, a 16-foot cast iron wheel should never be run faster than 105 revolutions per minute.

At a recent meeting of the Central Foundry Co., which is a consolidation of a number of the leading soil pipe works, it was decided to issue a new price list announcing an increase of 5 percent over the prices previously prevailing. Action to this end it is said has been taken on account of the increased cost of material.

The charcoal furnace of the Alabama & Georgia Iron Co. at Cedartown, Ga., has gone out of blast for repairs. It will probably be out for sixty days.

A MOTOR DRIVEN PLANER.

A planer of unusual dimensions has recently been built and is shown in the accompanying illustrations. The bed is of deep, substantial construction, with double walls where the gears are mounted. The sides are tied together by heavy box ties at short intervals. Has tracks of ample width; each track being fitted with numerous oil pockets and rollers for oiling. All the gearing has large pitches and wide faces; all the pinions being of steel, and all bearings being lined with bronze. The uprights, of box construction, are solidly bolted and keyed to the bed, with a very long bearing on the bed and unusually wide faces, and are tied together at the top by a wide, deep arch, on which are mounted the motors for driving the planer and for raising and lowering the crossrail.

The planer is driven by a 50-horsepower electric motor, and the armature shaft is extended to permit of mounting the return belt pulley on the end, thus giving a constant return speed. Between this pulley and the motor are three sliding pinions, any one of which may be engaged with a corresponding gear on a shaft mounted in bearings immediately below the armature shaft, by this means giving three cutting speeds of 12, 18 and 27 feet respectively. The handles which operate the sliding pinions are interlocked so that it is impossible for the operator to have more than any one arrangement in operation at the same time. A 7½-horsepower electric reversing motor for raising and lowering the crossrail is also mounted on the arch and connected to the top shaft by suitable gearing.

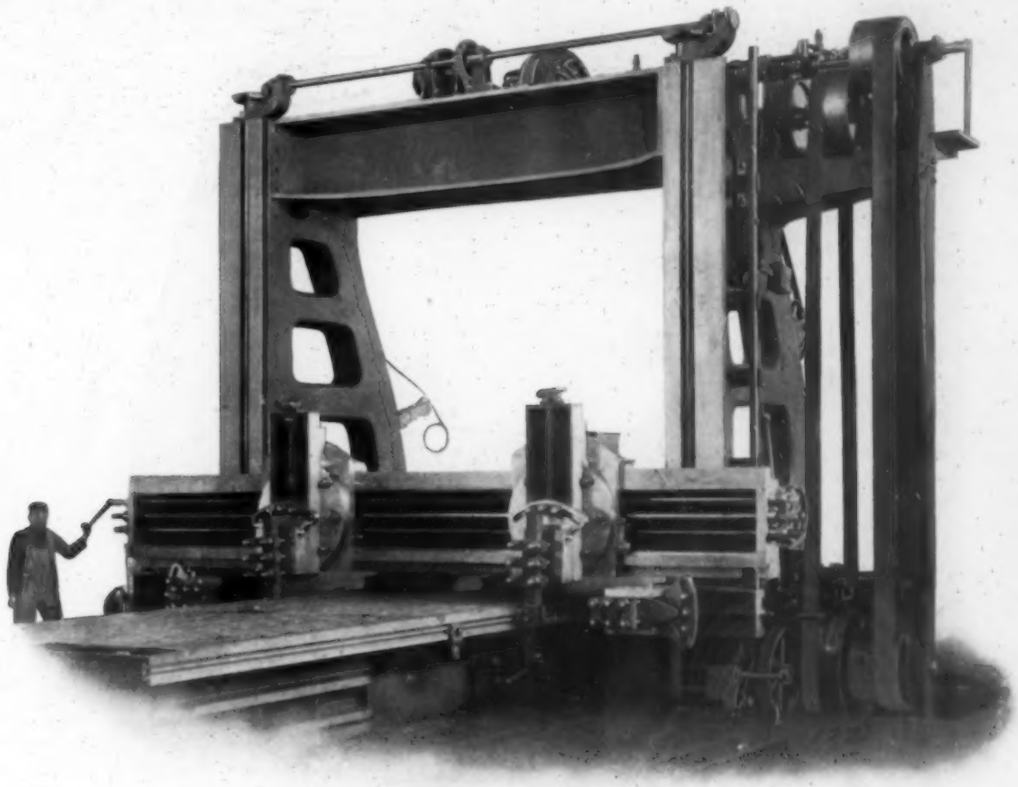


FIG. 1.—315,000-POUND PLANER BUILT BY NILES-BEMENT-POND CO. FOR THE WM. TOD CO., YOUNGSTOWN.

The crossrail is of extremely substantial construction, box form, with deep arched back. It is fitted with two swiveling saddles, each of which has a slide with long travel and a swiveling tool apron fitted with six bolts and three tool straps. The feed of each saddle is independent in all directions, and a rapid hand traverse is obtained by ratchet and pinion. A saddle is fitted on each upright; each saddle being fitted with a swiveling slide having long travel, and a swiveling tool apron fitted with six bolts and three tool straps. The side saddles can be brought below the top of the table, and the feed of each is inde-

pendent. The feed is variable across, down or at any angle for the crossrail saddles, and up and down for the upright saddles. It is driven positively by the driving gears instead of by friction. The feed box rotates only in one direction, and the feed can take place at either end of the table travel. All feeds can be operated by hand from either side of the planer. The feed mechanism is also arranged to give a rapid power traverse to the saddles.

The gross weight of the machine is 315,000 pounds. It was furnished to the Wm. Tod Co. of Youngstown, O., by the Niles-Bement-Pond Co. of New York. The tool was made at the Pond plant at Plainfield, N. J.

19,000 Steel Cars and 260 Locomotives for Pennsylvania.

The governors of the New York Stock Exchange have admitted $50,000,000 additional 3½ percent bonds of the Pennsylvania R. R. to trading on the exchange. In the application of the company, President A. J. Cassatt explains that the bonds are issued to provide funds for the purchase of 19,000 additional 50-ton steel cars and 260 locomotives, at an estimated cost of $24,000,000; also for the construction of the tunnel extension into New York and for the purchase of real estate required for stations in connection therewith. The expenditures for this purpose for 1902 and 1903 are estimated at $20,000,000. The bonds have been fully subscribed and paid for in cash.

H. H. Evans, of 127 Duane St., New York, who represents the Dunham, Harrigan & Hayden Co., San Francisco, is about to place an order for structural material, etc., to be used in connection with irrigation work in the Hawaiian Islands.

Foote, Burt & Co., Cleveland, have secured a contract for their machine tool specialties for shipment to A. Clement, care of Puthet & Co., Havre, France.

The Card Index System of the W. P. Davis Machine Co.

The card index system as adopted by the W. P. Davis Machine Co. at Rochester, N. Y., has some features of interest, and the several cards here illustrated will be found worthy of examination. The cards are of uniform size, 3x5 inches—a matter of no small importance in conveniently and compactly handling and storing them.

Fig. 1 is a blue card bearing the name of the Strong, Carlisle & Hammond Co., of Cleveland; blue showing that the firm deals in machine tools. The W. P. Davis Machine Co. will have in the same drawers similar cards made out in a like manner, the card stock, however, being in different colors. Thus dealers in machine tools are recorded on blue cards, buyers of supplies on straw colored cards, buyers of engines and boilers on white cards and so on according to the number of lines handled. The company usually employs but three colors, however. The other cards here illustrated are white.

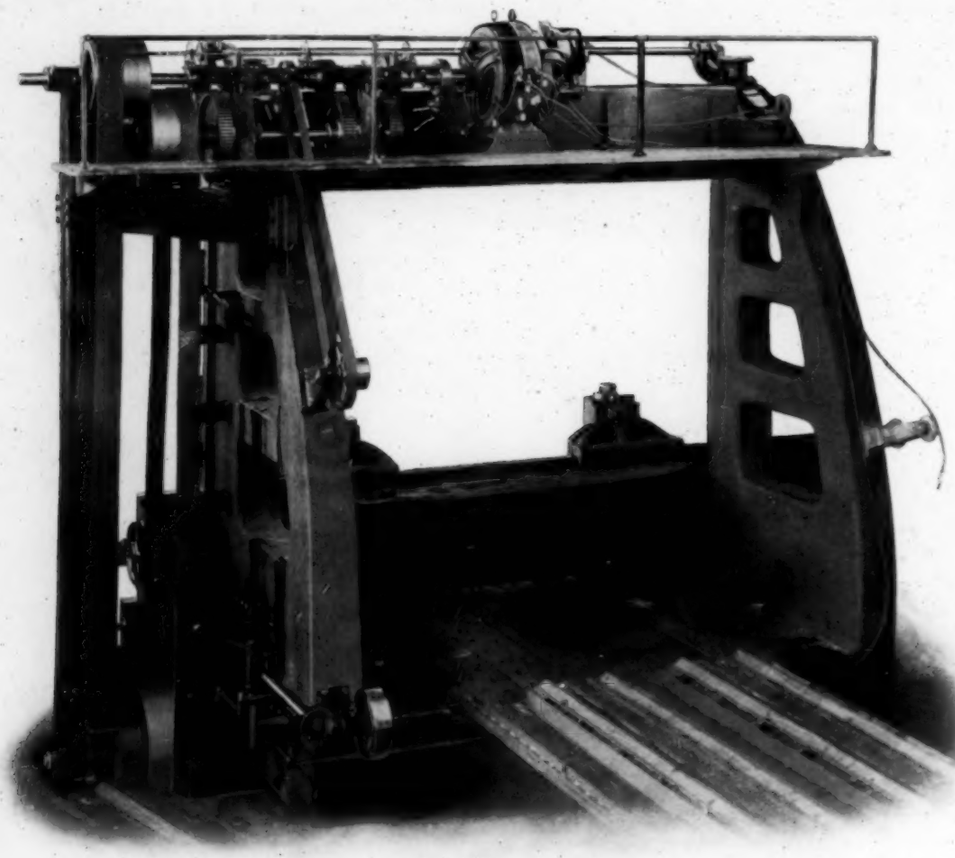


FIG. 2 —REAR VIEW OF MOTOR DRIVEN PLANER.

The card seen in Fig. 2 as made out to the Union Drawn Steel Co. is the result of an inquiry to the effect that the prospective purchaser required a 3-inch cutting-off machine. The history of the negotiations and the results are entered in due course on the face of the card. It shows that the original inquiry was received Oct. 30, 1902. A follow-up letter was despatched on Nov. 13, 1902, and on Nov. 19 an order was received for two machines. It is the office practice to make out one of these cards for every inquiry emanating from parties showing any intention of doing business, and this is of course something different from a mere desire to add to a collection of catalogues. The card allotted to the prospective customer is then dropped into an index "tickler" and will come to light again in about ten days, when a reminder will be mailed along the trail of the preceding letter. The card is then

put away in the monthly file and will appear once more at the expiration of thirty days. There must necessarily be a limit set to the letter writing which fails to bring an inquiry to the purchasing stage, and it is the custom of the company to drop the matter if not heard in reply in some manner or another at the third time of writing.

A card index is also applied to the various tools sold. Fig. 3 illustrates such a card which shows that the article

Name Strong, Carlisle & Hammond Co.
Street 61-67 Standish St.
City Cleveland County State Ohio
Business Drawn Machine Tools
Rating Credit Ledger Page B. 367
Buys Machine Tools C. 412
Circulars Sent
THE IRON TRADE REVIEW

FIG. 1.—MACHINERY DEALERS.

sold is a cutting-off machine and the number of the machine is 105. This is a 6-inch machine with two tools, manufactured by the W. P. Davis Machine Co. The cost of the machine is denoted by symbols and this amount plus the profit, etc., gives the selling price as $525. This machine was received from the factory in July, 1902, and was sold to the Farrel Foundry & Machine Co., of Ansonia, Conn., on Aug. 11.

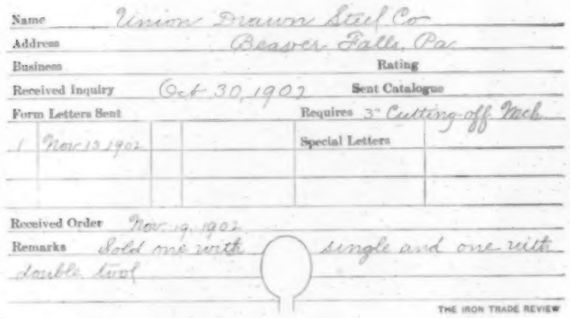

Name Union Drawn Steel Co.
Address Beaver Falls, Pa.
Business Rating
Received Inquiry Oct. 30, 1902 Sent Catalogue
Form Letters Sent Requires 3" Cutting-off Mch.
1 Nov. 13 1902 Special Letters
Received Order Nov. 19, 1902
Remarks Sold one with single and one with double tool
THE IRON TRADE REVIEW

FIG. 2.—RECORD OF PROSPECTIVE BUYERS AND RESULTS.

The handling of catalogues sent out by other manufacturers is a matter of considerable importance and is more frequently neglected than otherwise. The firm has a very convenient filing case and every catalogue is filed in such a manner that it can be removed without disturbing any other catalogue in the case; provided that a thoroughly effective method of getting at the catalogues without delay can be used in connection with a complete and well

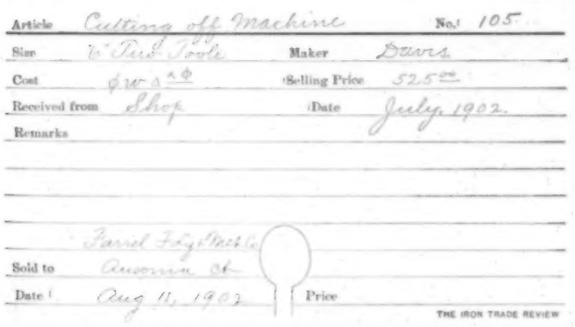

Article Cutting off Machine No. 105
Size 6" Two Tools Maker Davis
Cost $ Selling Price 525.00
Received from Shop Date July 1902.
Remarks
Farrel Fdy. Mch. Co.
Sold to Ansonia, Ct.
Date Aug. 11, 1902 Price
THE IRON TRADE REVIEW

FIG. 3.—RECORD OF MACHINES.

weeded stock of trade literature and this combination is employed in turn with a close price list, the man in control will be able to quote without delay on any goods his customers may require in his line of business.

Fig. 4 shows a specimen card used in such a connection. It refers to the Cleveland Twist Drill Co., of Cleveland, gives the catalogue number, etc. The card gives the articles manufactured; in this case drills, reamers, taps, milling cutters, etc.

The card illustrated in Fig. 5 is indexed according to the manufactures of other firms; in this case, "upright drills." It shows that the filing case of the W. P. Davis Machine Co. has various catalogues from builders of upright drills; the card giving the address of the manufac-

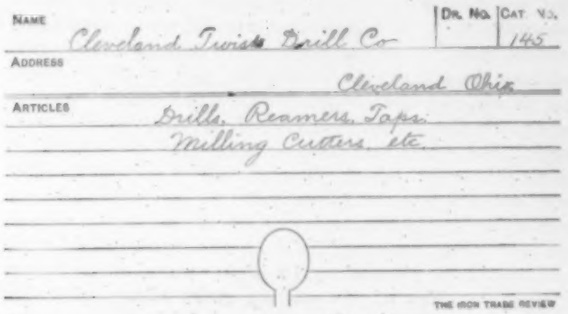

NAME Cleveland Twist Drill Co
DR. NO.
CAT. NO. 145
ADDRESS Cleveland Ohio
ARTICLES Drills, Reamers, Taps, Milling Cutters etc.
THE IRON TRADE REVIEW

FIG. 4.—INDEX TO MANUFACTURERS.

turers and the number of the catalogue, also the page on which references to upright drills may be found. If any one requires a drill that is not then in stock, it is possible to refer immediately to the various builders (and it must be remembered that the card seen in Fig. 5 shows only a a part of the list) and find the catalogue by the number and the page. It thus takes but a few seconds to find the

SUBJECT Upright Drills
NAME | ADDRESS | DR. NO. | CAT. NO. | PAGE
Gould & Eberhardt | Newark, N. J. | | 626 | 100
Niles Tool Works Co. | Hamilton, Ohio | | 63 | 130
Boynton & Plummer | Worcester, Mass. | | 71A | 28
Bickford D. & Tool Co. | Cincinnati, Ohio | | 71 | 22
P. Blaisdell & Co. | Worcester, Mass. | | 72A | 3
J. B. Snyder | " " | | 52A | 6
Manning, Maxwell & Moore | New York | | 1 | 167
Garvin Mch. Co. | " " | | 107 | 136
THE IRON TRADE REVIEW

FIG. 5.—INDEX TO CATALOGUES AND CONTENTS

printed matter relative to the product of any builder the company may require.

With the aid of the cards shown in Figs. 4 and 5 it is easy to refer directly to any article or firm. If for any reason one cannot recall the names of manufacturers of upright drills, a reference to the subject matter, "Upright Drills," will at once secure the name of the desired firm. On the other hand a reference to the name of the manufacturer will disclose the line of goods he makes.

The recent increase of capital by the Featherstone Foundry & Machine Co., Chicago, was to meet the demands of a rapidly increasing business. The company is now operating one of the largest jobbing foundries in the West and is running its plants to their fullest capacity.

We are advised that statements concerning a steel plant to be built by the Knoxville Iron Co., Knoxville, Tenn., are premature. The company intends to build a steel plant, but has just started its rolling mill and further plans will not be carried out at any time in the near future.

The Waterloo Motor Works, Waterloo, Iowa, has been organized with a capital stock of $200,000, the firm being a combination of the engine department of the Cascaden Mfg. Co. and the Waterloo Gas Engine Co., both of Waterloo, Ia. In addition to gas and gasoline engines, the new company will manufacture the Duryea automobile.

SUGGESTED AT THE SHOP.

By F. O. Reman.

I suppose that the majority of mechanics are familiar enough with steel—and I mean tool steel in particular. But there is a limit to the subject when you get to the matter of treating self-hardening steels, and any amount of room for argument. My own experience has not been altogether pleasant, and from inquiries made I take it that my little store of information is common to many other shop men. Self-hardening steel brings to mind some anxious moments at the forge. The heat had to be just right or the attempt at forging the tool to shape would fail utterly. Forging at the best seemed only a compromise with the shape you wanted, as the risk involved meant that something near to the form desired would be all you could expect. Any attempt at getting a nicely bent diamond point was usually out of the question owing to the liability of the tool to break at the bend. About the best thing that could be done with the contrary stuff was to give the piece of steel a slight upward tilt and then flatten the sides of the cutting point either with the hammer or take the safer course of doing this with the emery wheel. Such tools were capable of doing excellent service on the thin rims of pulleys and similar work where the cast iron was apt to be very uneven in hardness. The tools were capable of taking good heavy cuts, but they had their limitations even here. The edge was apt to crumble for some reason or another. Maybe there was not enough cast iron in the machine tool itself or the very hardness of the steel meant brittleness at the cutting edge. For these reasons a finishing tool of the self-hardening type was out of the question, and for the same reason either taps or drills were not considered as practicable products of Mushet or any of the family thereof.

* * * * *

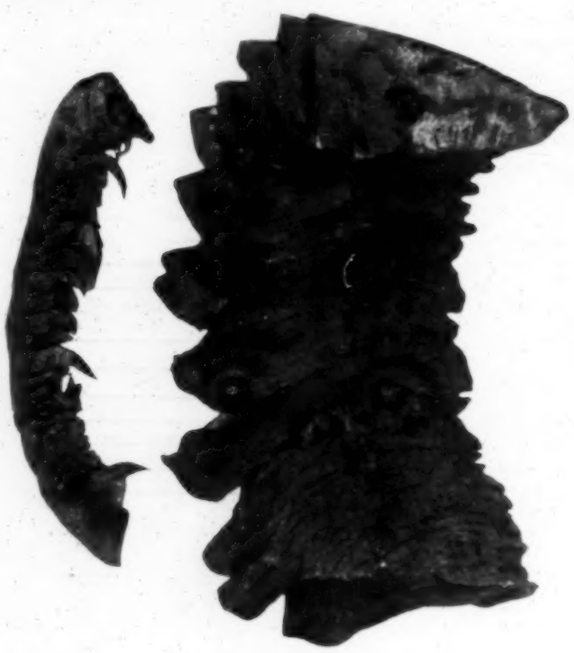
The above is simply my own boiled down experience with self-hardening steels, and it may not fit in with the shop history of everybody else. I think the majority of mechanics will agree with me, however, and in looking over the pages of a book recently reviewed in the columns of *The Iron Trade Review* I find this opinion practically duplicated as follows: "A great many machinists complain about self-hardening steel cutting tools, and say that it is impossible to accomplish fine results in turning or planed work with them, and for that reason a great many will not use them. Now when they say that for fine work they are useless, they are right, as it is impossible to get the edges of such tools to keep a keen edge for any length of time so as to allow of taking smooth finishing cuts. But for medium cuts and feeds and coarse thread cutting, machining cast iron in the shaper, planer or lathe, for turning brass castings and also for accomplishing different operations on cast iron parts in the turret lathe, they are unequalled and should always be used where the production of machine parts at the minimum of cost and labor is imperative. For the face milling of large castings where inserted tooth cutters are adaptable, the self hardening steel tools will be found to give the best results. There are several brands of self-hardening steel on the market in any one of which it will be found possible to hold an edge sufficiently keen to allow of its being used for the purposes herein enumerated."

* * * * *

Just what I said; but then there is so much interest in heavy cuts and quick speeds that I have had a suspicion that some other fellows may be doing even better than this opinion would indicate. And so far as that goes I am willing to concede that a whole lot of humbug is mixed up with the talk about heavy cuts, anyway. A heavy chip means that too much metal was put there in the first place for manufacturing processes. Either the pattern was not a close job or the molder or the smith blundered on the safe (and the slow) side. Maybe the blunder was started further back in the office somewhere, but in most cases, and no matter the cause, the result comes from the frame of mind that holds the big chip as an idol in every day practice. Of course a thin strip shaved off at a great speed is really the object of most mechanics in modern shop work. A big chip tells a good deal of a shop story, therefore. It lights up the whole subject of steel treatment from crucible to cut. The material, forging, tempering, grinding and setting of the tool; the material cut up and the machine employed; the speed and lubricant, etc., are all of decided interest and the heavy chip is a potent factor in shaping machine tool design. It points out weakness in any direction and the designer can take note thereby and spread the limit of attainment by treating the shortcomings only.

* * * * *

I have recently run across an instance of this sort and incidentally have widened out my own experience considerably. So much of a strain has in fact been put upon the stock of facts I had stored up that I shall have to rearrange these somewhat and therefore it is only reasonable that my informant should bear at least a share of responsibility for the statements. It came about from a meeting with Edwin R. Kent of Chicago and an exchange, pro and con, of the later shop experience with self-hardening steel. Mr. Kent's experience of late has been confined to Allen's air hardening steels and this fact may well be kept in mind, though I don't want to imply that the statements are altogether confined to this particular brand. In order to start the subject properly attention may be directed to the chips shown in the halftone. This is a little experience taken from a Western railroad shop and the chips are planed from a hammered iron engine frame. The same planer cut both chips and the two pieces of iron illustrate what has been and what may be done when the circumstances are all favorable.



A CUTTING AFFAIR.

As it was. As it may be.

* * * * *

The planer was a recent purchase, a 48x48-inch with an 18-foot bed, running at a speed of 24 feet per minute. The one chip is 3-16x½-inch and the other is ⅝x1½ inches. No one would count upon taking so heavy a chip as a regular thing. The delight in big shavings has not got to that stage yet. The experiment was just a plain endurance test on the pull of the machine and the pluck of the steel. The small chip tells the tale of former conditions as applied to the new planer and the big chip emphasizes the need of backing up the machine tool designer

with the best there is to be had in tools, and that is quite another story.

* * * * *

The man who pays the bills will naturally inquire how long such a strain can be kept up. I understand that this particular tool was kept at work for several hours without regrinding. Self-hardening tools when properly made can be kept at use in the shop for long periods without redressing. Regrinding will be necessary certainly, but the tool dresser has but seldom any need of reheating the work. The Buda Foundry & Machine Co. of Harvey, Ill., has had a set of tools in constant use for several months at a stretch on steel rails in the manufacture of frogs and crossings. But this question of endurance, interesting as it is, does not cover the "finishing cut" part of the subject. I hear of the increasing use of the steel for purposes where the old edge-crumbling malady would have barred its service. Some of the steel plants are employing drills from ⅞ to 1⅜ inches for drilling rails and I am told of a staybolt tap, a standard ⅞x26-inch, for locomotive fire boxes having been made of self-hardening steel and giving excellent service. A revision of my old time history in connection with steels of this type is now in order.

* * * * *

Some of the old methods must be thrown overboard in order to get the best results. Air hardening steel must be stewed to a dull red for three hours or so and then buried under ashes, hot cinders, or bone dust as convenient. This to anneal; but it can be purchased in the latter condition, and this is preferable of course. The fellow who has a steady job of annealing is the man to do the work. But if it has been bought hard then it can be put in the forge two or three hours before quitting time and kept hot until the whistle blows. The steel will be ready for the tool maker in the morning. The old method of burying the steel in lime does not seem to go well with tungsten and there is more or less tungsten, I suppose, in this class of tool steel.

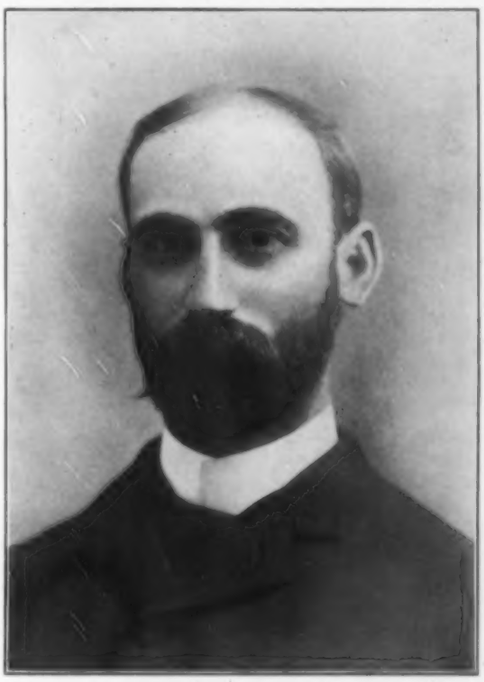
* * * * *

Hardening the steel is likely to shatter another supposition. Tool steel generally must be humored. There is a critical temperature beyond which the steel must not be heated. Beyond that stage it is burnt and may as well be cut away for a fresh start. Heres where the smith may be fooled by air hardening steel. The steel in order to get the very best results must be sweated to a white heat. The white heat should extend through the center of the stock, otherwise there will only be a case-hardening effect, not to speak of the strains which will be set up by the unequal treatment. An inequality, by the way, which has been the cause of many a die bursting before it got into actual service. This is another matter, however. In treating air-hardening steel, the piece may be put into water, say at 180 degrees, but oil is better and the air blast is of course the best. Brine seems to be useless for this work.

Within 24 hours after the fire at the plant of the Uniform Steel Co., Rahway, N. J., Feb. 4, which destroyed the boiler and engine rooms, machine shop, grinding, annealing, sand blast, shipping and chipping departments, the company had contracted for the erection of new buildings and now these buildings are about finished and the installation of machinery has been commenced. As the company did not have time to rebuild its steam power plant, it put in electric motors and is temporarily getting power from the local electric plant. It expects to turn out castings this week, about a month from the time of the fire. Considering that the buildings destroyed covered something over an acre, this was very rapid work, accomplished at a very large expense. This concern is only two years old, but its capacity has always been inadequate. The company has encountered floods (at the time of the overflowing of the Passaic River), coal strikes, exploding boilers and lastly a disastrous fire, but has shown great energy in overcoming all obstacles.

FIRST VICE PRESIDENT OF THE NATIONAL TUBE CO.

At the annual meeting of the National Tube Co. to be held this month Edward Worcester will be elected first vice president to succeed W. H. Latshaw, whose resignation was handed in and accepted last week. Mr. Latshaw resigned all active connection with the pipe and tube trade in order that he might give his extensive private interests more attention. Mr. Worcester in addition to discharging the duties of vice president will continue at the head of the sales department, a position which he has filled with great success since the organization of the National Tube Co. For the past thirty years Mr. Worcester has been connected with the pipe and tube business of this country and his extensive knowledge of the industry has earned for him his present merited advancement. In 1873 he was connected with the Chapman Valve Mfg. Co. of Boston, and in 1875 he entered the service of the Redfield, Bowen & Walworth Co. of Chicago, agents of the National Tube Works Co. In 1877 he became connected with the Walworth Mfg. Co., of Boston, Mass., and five years later entered the employ of the Crane Co., of Chicago, being elected secretary of that concern in 1884. In 1888 he was appointed local sales manager in charge of the St. Louis (Mo.) office of the National Tube Works Co., and in 1897 he was advanced to the position of assistant sales manager of this concern. When the National Tube Co. was formed he was made general sales agent.



EDWARD WORCESTER.

The Milton furnace, of the Wellston Iron & Steel Co., of Wellston, O., which has been out of blast for several months for repairs, was blown in on Feb. 23.

The Talladega furnace at Talladega, Ala., has been banked for repairs, which will require about one week to complete.

Hill Tool Co., Anderson, Ind., has moved into a new plant. Several new machine tools have been added to the shop equipment and a larger force of men put on. Business in the two months just passed has been up to the company's expectations, orders having been received from France, Japan and the British Isles, together with a good domestic trade.

The Ingersoll-Sargeant Drill Co. has recently taken a Mexican order for air compressors.

A NEW ANGLE COUPLING.

It often happens that power driven machines are required to face the light so that after locating them along by the windows in the side wall they may also be arranged along the end walls and driven by shafting parallel with the walls. Here two portions of shafting will be required, one at right angles to the other. The power transmitter illustrated herewith is designed for such contingencies, and is simply a means for coupling the shafts at the quarter turn. Two ways of turning a corner with shafting are available in addition to the one shown and are correspondingly common. One of these is by means of the familiar bevel gears, the other by the mule pulley stand. There are some unpleasant features even with bevel gears and the other method is troublesome on account of the quarter twist of the belt at four places which unduly stretch it at the edges as compared with the center so that the belt is rapidly worn out. The varying tightness of the blet has also a tendency to allow the belt to drop off the vertical guide pulleys on to the mule stand itself.

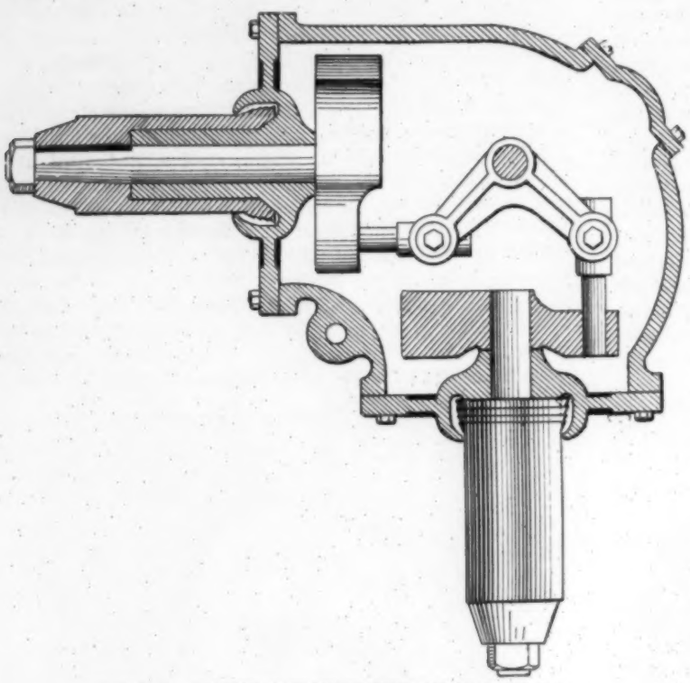


FIG. 1.—SECTIONAL PLAN OF NEW ANGLE COUPLING.

The contrivance illustrated in Figs. 1 and 2 has been patented by Prof. S. W. Robinson, of Ohio State University, and is manufactured by the A. Standish Estate, of Columbus, O. Figs 1 and 2 clearly show the casing and all the working parts. The main shafts extend from the outside, where the hub sleeve is attached, through the main bearings to the point where the main cranks are mounted on their inside ends. A bell crank is fitted to turn and also to slide up and down on a main central rod; between the arms of the bell crank and crank pins are fitted knuckle pieces which slide and turn on the crank pins and also on pins in the bell crank arms.

The motion of the transmitter is peculiar. As the driving crank starts from the position shown, the bell crank, sliding on the vertical central rod, starts to slide up, and this of course causes the driven crank pin to move. Soon, on account of the arc motion of the driving crank, the bell crank is made to turn on its central rod as well as slide and this sliding and turning due to the driving crank causes the driven crank pin to move in exactly the same arc movement. At the position 90 degrees from the start, the bell crank will be at its highest position and will simply rotate for an instant on its central rod. This causes a turning of the driven crank exactly like that of the driving crank. From this point on for the next 90 degrees, the movements of the first 90 degrees will be duplicated in the inverse order, and so on for the entire revolution and in repetition. It is thus seen that the movements of the driving crank are exactly duplicated in the driven and that consequently the velocity ratio of the transmitter shaft is constant, or that the velocity of the driven shafting is steady, or like that of the driving shaft, and all the parts are carefully counterbalanced.

The crank shaft and crank pins are made of high-grade steel and the central rod is of mild steel, case hardened and ground. Each transmitter is tested by being run for several hours until all parts are brought to smooth and easy turning. The mechanism is all contained in an oiltight case and in practice this cavity is supplied with a quantity of lubricating oil. A hand hole is provided on the side opposite the pulleys, as shown in Fig. 1, through which the interior may be examined. An oil hole and funnel is placed upon the case for the introduction of the lubricant, and the quantity at any time is shown by a glass tube.

Grooves are cut in the main bearing to which holes carry oil from an oil funnel; and from which the oil returns through other holes back into the main casing, so that by pressure the oil is caused to flow the whole length of the main bearings. This interior funnel receives ail from the splash direct, as well as catching it as it runs down along the inner wall of the case. The crank pins slide and rotate in the knuckle pieces and also dip into the body of oil within the case at each rotation, so that lubrication is assured on these parts. The driven shaft may be run faster or slower than the other, depending only on the relative sizes of the pulleys placed upon the shafts. Usually the pulley on the driving shafts is about the same size as that on the transmitter, though of such size as not to drive the transmitter in excess of its maximum speed.

The transmitter should be screwed firmly to the ceiling timbers, and it may be necessary to bolt 2-inch planks by lag screws to the ceiling joists. In this the transmitter may be higher or lower than the shafts to be connected so that dressing of the planks for a seat may be done, or "shims" may be introduced to bring the transmitter to the proper position. This transmitter can be connected directly to the ends of the driving and driven shafts as by

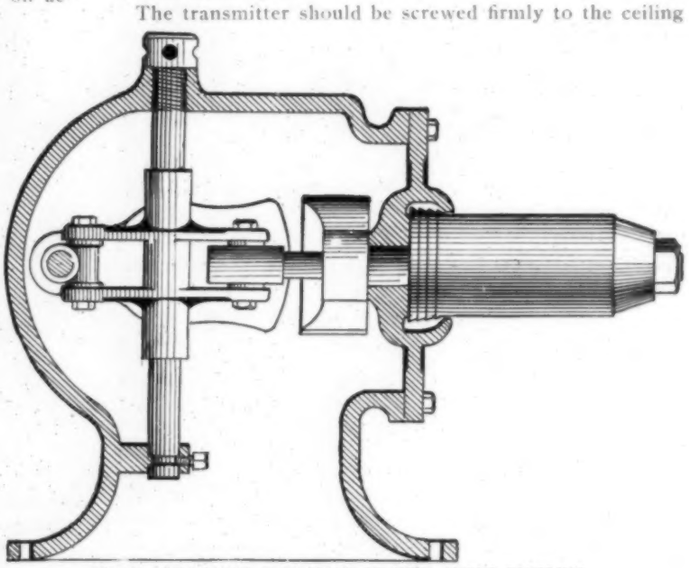


FIG. 2.—SECTIONAL ELEVATION OF NEW ANGLE COUPLING.

extending the ends of the shafts into the transmitter case and mounting the cranks upon them; or common couplings may connect the ends of the shafts with the shafts of the transmitter, but in this, great care is necessary to secure the alignment required for satisfactory action as a small error in the angle between the two shafts would cause friction and heating. If such connection with the shafts is desired, couplings between the shafts and transmitter should be employed which admit of a little flexibility; as in the case of common flange couplings with the bolts left loose.

Cincinnati Machinery Market.

March 3.

The month of February has been a banner one among the machinery and machine tool manufacturers in Cincinnati. The demand has increased in volume and orders were heavier than for some time. In some lines of machine tools the orders were larger than ever before and even the increased facilities of local shops will be taxed to keep up with deliveries. A noticeable feature of the trade is the demand from Canadian markets where the high tariff of 25 percent has been considered a strong handicap; but in spite of it some nice orders have been taken in competition with Canadian manufacturers. This is regarded as a high compliment to the efficiency and general merit of Cincinnati-made machine tools. The foreign trade has not been of importance, but a few scattering orders were received which helped to swell the large general demand. There are many improvements and additions to the shops under consideration. Some of these have not yet taken shape, but they are so necessary to the accommodation of the heavy business being done that the advent of spring will no doubt mark the beginning of another period of active construction of new shops and additions to plants among the machinery interests. This argues well for the confidence so generally felt in the stability of conditions and the outlook for the future. Among the heaviest buyers in the past month have been the railroads and the manufacturers of electrical supplies. The tendency among shops everywhere is to use electrical power, and motor driven machines are gaining in popularity. The manufacturers of motors are having large orders right along and the activity in this line attests the tendency noticeable in the general demand and comments of machinery men.

The Lodge & Shipley Machine Tool Co. reports indications in general trade that there is more demand for machine tools now than at any time in the past decade. This is so pronounced that it approaches the boom stage. This is something that is viewed with regret, as a steady demand covering about the output is considered far preferable. Orders at this plant since the first of the year are 50 percent in excess of capacity and thoroughly well distributed over the United States. There is more railroad purchasing now than formerly. The demand for motor drives continues to grow, and the demand for this company's single pulley drives is increasing daily because of its giving increased capacity to the machine. This demand is brought about by the new high speed steels. The demand is constantly being made by customers to know the highest cutting speeds and the best feeds for the various metals, and for the information of its customers the firm is continually making exhaustive tests which are proving the necessity for greater power and greater strength in machine tools. The labor situation so far as machine shops are concerned seems to be as pacific as can be expected under the circumstances. Some disturbance is noticeable among pattern makers, but it is believed this will blow over. The intelligent element among the workmen are realizing that proprietors are giving to the workmen their share of the prosperity in advanced wages and up-to-date accommodations for their comfort and convenience. There is also a fair foreign demand because of improvement in product and efficiency, brought about by the strenuous effort to get more power, greater strength and capacity from American made tools.

The Cincinnati Machine Tool Co. reports that February marks the largest month's business in its history, orders from railroad shops being particularly heavy, also an increased demand from electrical shops.

The John Steptoe Shaper Co. reports a good demand for shapers, orders increasing and trade conditions generally satisfactory.

The Rahn-Mayer-Carpenter Co. is meeting a good, well-distributed demand, with orders increasing. It has plans and specifications submitted for a new warehouse 65x90 feet with a B. & O. S. W. R. R. switch running into it. Bids of the contractors were opened Feb. 28.

Greaves, Klusman & Co. are expecting to arrange for an addition to their buildings in the near future to be used for storing patterns. They have recently put in a new 36-inch automatic gear cutter and a roughing lathe.

The Cincinnati Milling Machine Co. has found orders heavy and the past month has been a large one for the company. It has taken orders for about a dozen of its new pattern geared feed millers from Canadian points in the past three months. In view of the high Canadian tariff on machinery from the United States this is quite gratifying, as it indicates that the prosperity in Canada is sending the Canadian buyer into the market for new equipment even at high level prices.

The Cincinnati Planer Co. had an excellent month's business. Nice orders were taken from the Allis-Chalmers Co., the Wheeler Electric Co. and the Russell Co., of Massillon, O. The company has just placed orders for machinery for a new pattern shop which will be in operation in about thirty days. The equipment will be motor-driven and the company will utilize a part of the building recently erected on the opposite side of the street from the main buildings of the plant.

The Cincinnati Punch & Shear Co. is looking for a site to erect a new plant. In the past year the business has increased to such an extent that present quarters have become too small. The working force will be about twice the number now employed as soon as the new location can be made available.

The American Laundry Machinery Co. is finding a good demand for its product in foreign markets. The company has recently shipped four car loads of laundry machinery to Oakland, New Zealand, where a large commercial laundry is being established; one car load to Sydney, Australia, and one car load to Vienna, Austria.

The Triumph Electric Co. has secured an order from the Standard Rock Candy Co., of New York City, for 30 motors and generators, ranging from 2 to 50 horsepower, also the contract for generators from the St. Cloud (Minn.) Street Railway Co. One generator is of 400 horsepower and four are of 50 horsepower each.

The Fosdick Machine Tool Co. has recently secured a contract for $10,000 worth of radial drills from the Locomotive & Machine Co., of Montreal, Que. This Canadian company has lately expended $300,000 for materials.

The Fay & Egan Co.'s annual stockholders' meeting took place Feb. 17. The company did a large business in the past year. A dividend of 5 percent was declared on the common and 7 percent on the preferred stocks. The year shows a net profit of $205,000, after putting aside $30,000 for bonds and $73,000 for depreciation.

A change of more than usual interest is that recently made in the management of the American Tool Works Co., brief mention of which has appeared in these columns. The president of the company, Franklin Alter, purchased the shares formerly held by Robert Laidlaw, Thomas P. Egan, and the estate of Thos. McDougall, and now holds the controlling interest. J. B. Doan has been made general manager, and L. E. Voorheis, the former vice president and general manager, has resigned, although still retaining his interest as a stockholder. The new general manager, J. B. Doan, is widely known throughout the machine tool trade, and has been connected with this line of work throughout his entire business career. He was formerly with the Lodge-Davis Machine Tool Co., as well as with the Davis-Egan Co., which firms were later absorbed by the American Tool Works Co., in whose employ Mr. Doan continued, as Western selling agent in Chicago, under the firm name of J. B. Doan & Co. A little over a year ago this latter firm was succeeded by the O. L. Packard Machinery Co., and Mr. Doan came to Cincinnati as manager of the American Tool Works Co.'s sales department. He brings to his new position as general manager a keen insight to the business and a thoroughness of purpose which promise well for the continued success of the firm.

A general order was issued Monday, March 2, by the secretary of the local pattern makers' union, calling out all union members. This action is taken as a result of the notice sent out on Wednesday, Feb. 25, addressed to all members of the Cincinnati Metal Trades Association, in which there was a demand for a uniform wage increase of 10 percent. A meeting of the Cincinnati Metal Trades Association was held Monday evening, March 2, but it is understood that but one or two firms have thus far been seriously affected by the strike. None but union men have gone out, but as the strike is of such recent origin its effect can not be foreseen at the present time.

MACBETH IRON WORKS BLOWING ENGINE.

Two blowing engines have been built for Charlotte furnace of Corrigan, McKinney & Co., Scottdale, Pa., by the Macbeth Iron Works of Cleveland. They are of simple and rugged construction. Each has 54-inch stroke, 42-inch steam cylinders, and 84-inch air cylinders. The

FIG. 1.—BLOWING ENGINE BUILT BY THE MACBETH IRON CO. OF CLEVELAND.

flywheels are 16 feet 6 inches in diameter and weigh 20 tons each. They are turned on rim. The crank shaft is 16 inches diameter and 8 feet 6 inches long. Cross heads of forged iron and 24 inches deep. The connecting rods have solid ends with brass boxes and provision for thorough adjustment. The steam cylinder has a piston

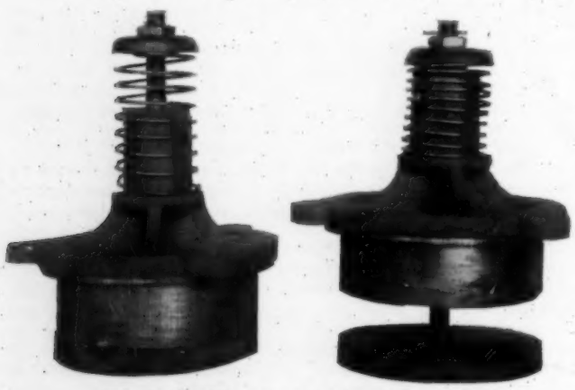


FIG. 3.—INLET VALVES—CLOSED AND OPEN.

valve 15 inches diameter. A counterbalance is applied to the piston valve. The valve gear is of forged steel and finished all over. The air piston is fitted with maple packing in the usual manner. The steam piston is of the common type with bull ring and two spring rings. Both inlet and discharge valves are 6⅝ inches diameter. There are 39 inlet and 29 outlet valves in each head. Air and exhaust valves are of the poppet type with leather discs; the valves being formed of three leather discs cemented and riveted.

The engine develops about 1,100 h. p., and 100 pounds steam pressure gives 20 pounds air pressure. The total height of the machine is 27 feet from floor. The floor

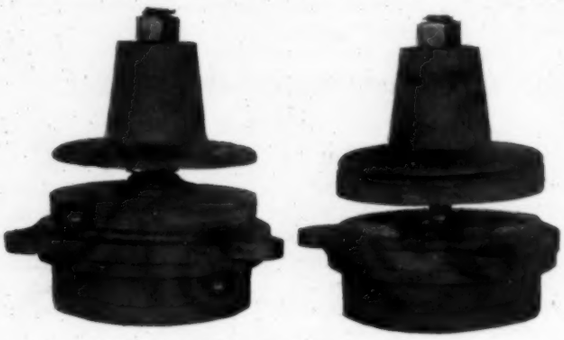


FIG. 4.—OUTLET VALVES—OPEN AND CLOSED.

area is 16 feet 6 inches by 14 feet. Rated capacity is 13,000 feet of free air per minute.

Lennox Machine Co., Marshalltown, Ia., manufacturer of punches and shears, contemplates adding an addition to its machine shop this spring. Since January 1, orders have been received for bevelers and splitters from the following concerns: Chicago Great Western Railway Co., Oelwein, Ia., 8-foot splitter; J. F. Holbrook, Los Angeles, Cal., 24-inch throat splitter; Burns Boiler & Mfg. Co., Green Bay, Wis., one No. 2 beveling machine and one 8-foot splitter; Holthoff Machinery Co., Cudahy, Wis., one 30-inch throat splitter; Missouri Boiler Works, Kansas City, Mo., one No. 2 beveler; Practical Gas Construction

FIG. 5.—PLAN OF AIR CYLINDER.

Co., Chicago, one No. 1 beveler; Minneapolis Threshing Machine Co., Hopkins, Minn., one 24-inch throat splitter.

Kent Lubricating Co., Waukesha, Wis., is putting on the market a compound known as "Kent Anti-Rust" for coating machinery. It is absolutely guaranteed to prevent rust on all kinds of machinery and steel, and being in the nature of a lubricant, leaves the steel bright and shiny. Neither the sun nor the cold weather affects it, and it will stand 350 degrees of heat and of cold 32 degrees below zero. The company's trade increased 20 percent during 1902, and has necessitated removal into a larger plant.

ROTARY PRESSURE BLOWERS.*

BY GEO. C. HICKS, JR.

In 1859 Messrs. P. H. and F. M. Roots were engaged in the woolen business in Connersville, Ind. Their mill was on the banks of a water power canal, and they determined to build a water motor to furnish their power. Their first idea was in principle the rotary blower of today. It was made of wood throughout, except the wrought iron shafts and cast gears. The pistons, or impellers, were of wood, built up on wrought iron froms, fixed on the shafts, and were planed to the proper curves. The case was built up in segments, held in place by the wooden heads. This first machine was placed in operation and run a short time, when the water caused the impellers to swell and effectually checked any further rotation. Taking the machine to the shop, the swelling was reduced and the machine belted to a line shaft for further test as to fit. While running in this manner a foundryman standing by noticed a strong current of air coming from the discharge side, and remarked, "I believe that machine will melt iron." That remark put the bee in the bonnet and the Roots brothers practically devoted the rest of their lives to the development and manufacture of the pressure blower. The trials and tribulations of introducing the machine on the market would hardly interest you, though I have no doubt a few of the older members here present shared in them and gave many valuable hints for overcoming them.

Since that time several forms have been tried, one in which three impellers were used, but after being submitted to the test of practical work, the survival of the fittest is represented in the two impeller machine, a close copy of the original conception.

To those who are not familiar with the machines as built today, I would say that they consist of two impellers, mounted on parallel shafts, the curves of these impellers so formed as to be in constant contact with each other, as the two shafts revolve at a uniform speed. The capacity of the machine is four times the space between the case circle contacts of the impeller curves, for both sides of each impeller are presented to the discharge chamber at each revolution. These impellers are not run in actual contact, a clearance of from 1-64 to 1-100 inch is left over the entire rolling surface, which clearance is afterwards taken up by the use of a metallic grease evenly coated over the surface of the impeller. You will thus see that the slip of air must be small, and consequently the volumetric efficiency high, in this type of machine; in fact, it is seldom, under ordinary foundry pressure, that the slip of air exceeds 10 percent, and in many cases is as low as 6 percent.

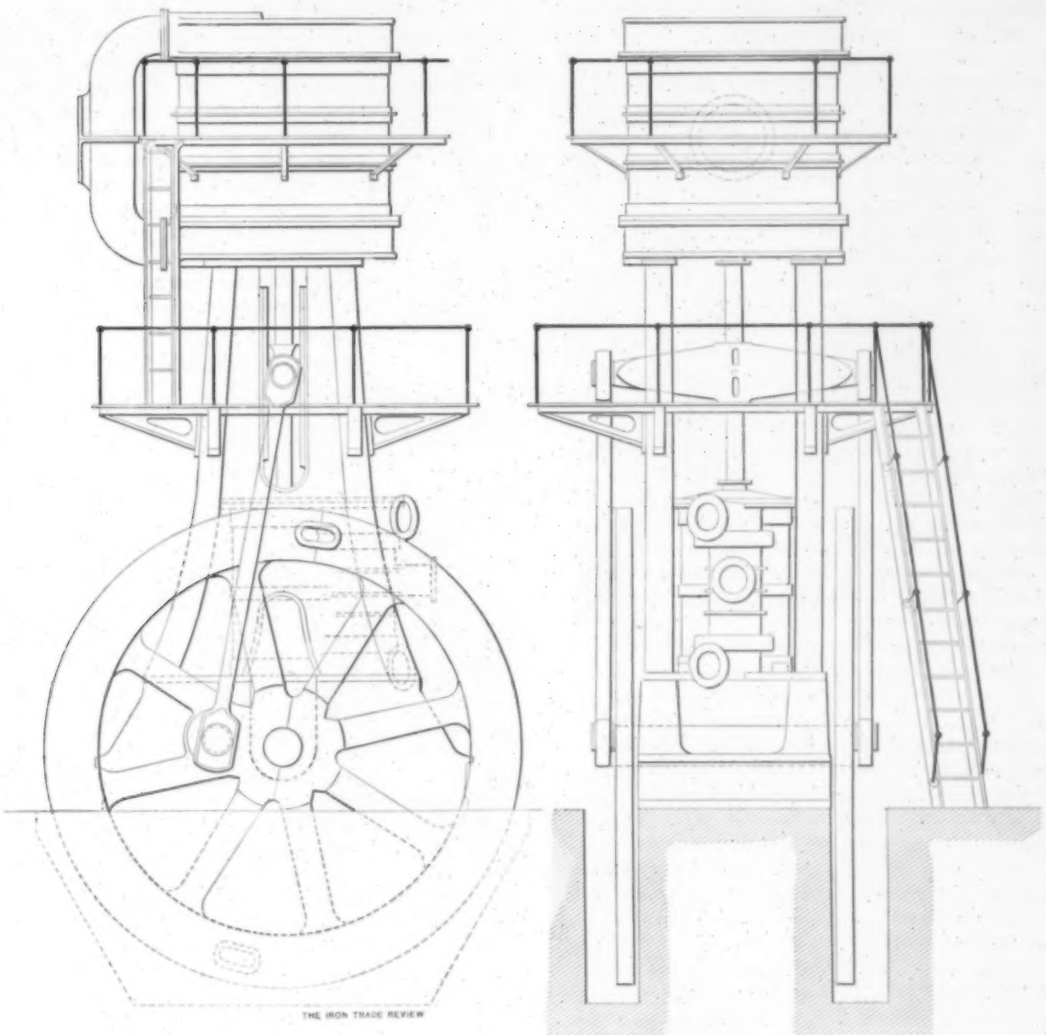


FIG. 2.—SIDE AND FRONT ELEVATIONS OF NEW BLOWING ENGINE.

The friction of the machines is nearly a constant quantity, under varying pressures, and this point leads us to the question where the field for the centrifugal blower ceases and that of the rotary begins. You will see that the friction being nearly constant, at low pressures the friction would be a large percentage of the total loss of work; but as the pressure increases, this percentage of work lost becomes a less and less proportion of the total work done. I want to be fair to our friends of the fan (though they may not agree with me), and we shall probably always have a bone of contention over the dividing line of our re-

*Read at the March meeting of the Pittsburg Foundrymen's Association, Pittsburg, Pa.

spective fields, especially as grief jobs and poor engineering often give a false idea of the actual value of the respective types. We have found from tests, but mostly from practical operation in the foundries, that the line of separation lies between seven and nine ounces of blast pressure. Between these limits, the engineering and local conditions of space and power must determine which is the better machine to use. Judging from the demand and pressure given by our correspondents, I should say that the tendency in foundry practice is towards higher pressures, as that means quicker melting and consequently larger output. You, gentlemen, are better judges than I of what pressure is best suited to your coke, your iron and your general conditions; but it is a well established fact that heavy blast means a high degree of heat, and consequently more active chemical reaction to get rid of the impurities that pass off, either as gas or in the slag, and I believe that a cubic foot of air at 12 to 16-ounce pressure gives a better efficiency in combustion and reduction than the same amount at a lower pressure.

The points of merit in the positive blower are briefly these: a vibrating blast which will build up as occasion requires and tend from its character to keep the downward movements of the contents of the cupola continuous, also to run up the pressure high enough to break up any construction in the cupola. These obstructions may be either a bridge forming in the cupola, or an excess of melted iron, when some large casting is required, which causes the molten metal to rise above the tuyere irons. In this case the tuyeres offer more resistance, the pressure rises, keeping the metal from freezing on the nozzle, and the nozzles open until a tap brings the metal down to a safe point. A moderate speed, admitting of direct connection to an engine or single reduction to a motor. An absolute surety of getting a definite quantity of free air per revolution at whatever speed the machine is to run, whether faster or slower, without appreciable loss of economy. This great flexibility of the positive blower allows it to fill almost any condition of piping arrangement. In many cases the source of power is at some distance from the foundry, and the loss in pressure, due to pipe friction, is considerable.

With the positive blower the amount of free air taken in by the machine is a constant quantity; the power needed in excess is just sufficient to offset the friction of the pipe and the cupola gets the same quantity of air, at the required pressure. Again, through a misunderstanding of conditions, too small an amount of air, or too low a pressure may have been calculated upon. A simple speeding up of the machine will overcome either of these conditions without loss of economy. It is best to sell the user a machine having some margin, as nearly all foundrymen push their cupolas before putting in new or larger ones, and 10 percent to 20 percent excess in capacity is a very convenient thing to have around.

In regard to power, we have found that the positive foundry blower at 16-oz. pressure has a normal loss of about 10 percent in slip of the air, 8 percent to 10 percent machine friction and about the same for the source of power, whether an engine or single geared motor. A belted rig means 2 per cent to 5 percent additional loss, according to the condition and application of the belt. These losses make a total loss of 23 percent to 25 percent. In other words, the total efficiency of the blowing installation is 73 percent to 75 percent. These figures have been proved again and again and I feel perfectly safe in giving them to you. Thus we find that a 37 cubic feet machine, melting 12 to 12½ tons an hour, requires, on a 70 percent basis of total efficiency, 37 h. p. Actual results show all the way from 32 h. p. to 36 h. p. according to the mechanical condition of the plant. Personally, I am a believer in ample power allowances, and would recommend a 40-h. p. engine or motor, so as to be ready to meet and overcome contingencies that may arise.

Positive blowers have been severely tested by smelting works, where the average pressure is about 3 pounds, and under these conditions 90 percent and 93 percent volumetric efficiencies are obtained.

It might entertain some and bore others to discuss the merits of the different curves used on the impellers of positive blowers, but suffice it to say that different uses require different curves, and that the utility of any particular curve lies not in that curve, but in the workmanship in the shop. A slight difference in curvature, for some mechanical convenience, makes little or no difference to the foundryman; a slight difference in workmanship makes all the difference in the world in the operation.

A word as to the proportioning of blower capacity to your cupola: Don't cut your cloth too close, for then it may rip at the seams. Was there ever a foundryman who did not want to get from 10 percent to 25 percent more than the rated capacity out of his cupola? Long life means a life of uniform conditions within one's limits Every excess of those limits means a strain and permanent damage to the system. So with machines; make it easy for them and they will make it easy for you.

If you have a pipe to run, remember that the shortest distance between two points is a straight line. Make it easy for your air and you won't have joints slipping out. A direct connected engine, running on the throttle or adjustable cut-off, and a variable speed motor, are, in my opinion, two ideal methods of handling air for cupola work, for either rig requires a minimum of attention and repairs, coupled with great flexibility.

Empire Steel & Iron Co.

At the annual meeting of the Empire Steel & Iron Co. last week, the retiring board of directors was re-elected with the exception of F. M. Davis and David Gamble, who were succeeded by T. Kleeberg and J. W. Fuller. The following condensed balance sheet was presented as of Dec. 31, 1902: Assets—Real estate, plant and machinery, $2,842,900; stocks and bonds, $2,075,002; cash in bank, $105,221; accounts receivable, $139,884; bills receivable, $107,550; inventory pig iron, raw materials, ore, etc., $314,375; advance royalty and payment on ore contracts, $35,934; total assets, $5,620,867. Liabilities—Capital stock, preferred, $2,500,000; common, $2,281,400; total, $4,781,400; bills payable, $469,861; accounts payable, $173,277; pay roll, $14,832; funds for depreciation and bad debts, $15,356; dividend payable Jan. 1 (semi-annual), $37,500; profit and loss, $128,689; total, $5,620,867.

The directors report to the stockholders that the net earnings from operations, investments, less $46,575 charged off for depreciation, were $203,087, and further that an additional sum of $170,147 was expended for improvements and charged to profit and loss. The anthracite coal strike, they state, compelled the company to stop its furnaces during the generally active iron market, causing a loss of fully 60,000 tons of pig iron production. This would have added largely to the year's product. The report also speaks of the Oxford and Mount Hope ore mines in Warren and Morris counties, N. J., which have now been equipped with a large modern power plant. These will reduce materially the cost of mining and give the furnaces a large supply of high grade cheap ore for many years. All the furnaces of the company are now in full operation and produce about 1,000 tons of iron daily.

At the annual meeting of the directors of the Michigan Malleable Iron Co., Detroit, the following officers were elected: William C. McMillan, president; Phillip H. McMillan, vice-president, to succeed the late Senator James McMillan, and George M. Black was elected secretary. T. H. Simpson was elected treasurer and general manager. The past year has been a very prosperous one for the company.

The John James Co., La Crosse, Wis., which operates a foundry, has made an assignment. Work at the foundry was resumed after suspension for a few days.

The plant of the South Texas Iron Works, Houston, Texas, a bankrupt concern, will be sold March 25 by the trustee elected by the creditors.

The Western Machinery Market.

OFFICE OF *The Iron Trade Review*,
519 MONADNOCK BLOCK, CHICAGO, March 3.

Northern Engineering Works, Detroit, Mich., crane builders, report the volume of business, both from home concerns and abroad fully equal to the corresponding period of last year, with an increasing demand for electric cranes. Among recent installations of the latter, ranging in capacity from three to forty tons, are the following: C. D. Jackson & Co., 25-ton crane; Detroit Ship Building Co., five cranes; Allis Chalmers Co., Milwaukee, Wis., twelve cranes; American Shipbuilding Co., three cranes; P. A. Clum & Co., C. & G. Cooper Co., and the Macbeth Iron Co. Hand power cranes of the traveling or jib type have also been installed in the works of the Carpenter Steel Co., Insurance Stove & Range Co., Western Gas Construction Co., Mathewson Alkali Works, Colburn Machine Tool Co., five cranes; American Car & Foundry Co., Berwick, Pa., twenty-four cranes.

Hill Machine Co., Anderson., Ind., manufacturer of pumping machinery, informs us that its business is steadily increasing and that the prospects for the present year are flattering. Many new customers have been secured, shipments being made to all points of the United States, with a scattering export trade. The company intends developing the latter, and is negotiating with New York parties with this end in view.

Northern Electrical Manufacturing Co., Madison, Wis., is completing an order for six twin generators for direct connection to De Laval steam turbines. Three twin generators of 200 k. w. capacity have already been shipped and three of 150 k. w. capacity are now under way.

Standard Railway Equipment Co., St. Louis, Mo., manufacturers of pneumatic tools, advises us that its factory is running to the fullest capacity and that a large addition to the plant, which is located in East St. Louis, is being built. The company is about to place on the market a new type of drill for both wood and iron, in ten different styles and sizes. The new riveting hammer which has just been offered the trade has proven a success and many orders are being received for it. Among the consignments recently shipped abroad was one of large proportions for the Japanese government.

Crawford & McCrimmon Co., Brazil, Ind., builder of hoisting engines, steam pumps, ventilating fans, etc., is having a heavy demand for its line of machinery, and has orders in hand that will tax the capacity of its plant for three or four months. The indications for trade this year, it says, point to a volume of business of greater proportions than was done last year, and it predicts that the demand for hoisting engines will be greater than the capacity of the shops of the country to supply. The company has recently shipped to the Alabama Steel & Wire Co. a double hauling engine, 24x36 cylinders; to the Atlas Coke Co., Waltersburg, Pa., one 20x36, and one of 15x30 cylinders to Strawn, Tex., besides having filled a number of orders for ventilating fans and engines of various capacities.

Anderson Tool Co., Anderson, Ind., manufacturer of electrically driven universal grinders, has orders on its books, among which are a number from Europe, that will keep its shops busy for some time to come. It is sold so far ahead on gas and gasoline engines, that a day and night shift will be put on to keep pace with the demand. A 50 h. p. Burger automatic gas engine is being added to its power plant to accommodate the additional power equipment required.

Fisher Governor Co., Marshalltown, Iowa, reports a good demand for steam pump governors, the orders received being more numerous than in the same period of last year.

Dake Engine Co., Grand Haven, Mich., has lately submitted blue prints to the Underground Electric Railways Co., Ltd., London, England, of an automatic closing device for opening and closing some 14-inch high pressure steam valves. The rig is entirely automatic and is operated from the engine room floor by means of a three-way valve. Business received this year has been of a flattering nature. The company reports orders received including six lifting machines and two pilot house steam steering gears for A. Booth & Co.; 18 pneumatic chain hoists and air motors to Hill, Clarke & Co., Boston; eight pneumatic hoists and motors to The Holland Co., Chicago; two pilot house steam stearing gears to the Lake Superior Dredging Co., Duluth, Minn., and one ship windlass and steering gear to the Manitowoc Dry Dock Co., Manitowoc, Wis.

Reeves Pulley Co., Columbus, Ind., reports that the demand for "The Reeves" variable speed transmission is growing with such rapid strides that it is absolutely impossible to fill the orders with any degree of promptness, although the shops have been running 24 hours a day, with several new iron working tools added to the equipment. The company is now 75 to 90 days behind in its shipments. An order was recently booked for 20 transmissions from a Philadelphia concern, also one for export. Last month, the first foreign order for a large two-piece solid cast iron machine was received. The business on transmission machinery has grown to such proportions that it has become necessary to enlarge the factory. Orders have been placed for new foundry equipment, which will be installed as soon as the new buildings can be completed, probably early in spring.

Model Gas Engine Co., Auburn, Ind., has received orders and made shipments in the past month to New Zealand and Buenos Ayres, South America, both the result of the recent establishment of agencies in those countries. Domestic trade has been of good proportions.

Murray Iron Works Co., Burlington, Ia., reports that there are more inquiries this year for Corliss engines and boilers than ever, and anticipates a good trade this spring.

American Steam Pump Co., Battle Creek, Mich., advises us that it believes the year 1903 will be the banner year up to date in the history of American manufacturing. Sales last January were 10 percent greater than in January, 1902, and it expects that February will show a greater gain. The company is increasing the capacity of its plant and installing additional machinery as the volume of trade warrants it, and is also increasing the line of March pumps, which are now made in seven hundred different styles and sizes. There is no diminution in its export trade, sales being made constantly with most foreign countries.

Stephens-Adamson Mfg. Co., Aurora, Ill., manufacturers of elevating and power transmitting machinery, has a very comfortable amount of work in its shops, consisting of machinery for the installation of belt conveyors and some large rope transmission. In the past winter, considerable work in the line of elevating and conveying machinery has been done for cement plants and chemical works in different parts of the country. On the day of writing a carload of rope sheaves were being shipped to a large plaster works in the east to be used in an installation of several manila rope drives. Inquiries and prospective business, especially from the south, it reports, have been very satisfactory. A new 5-inch boring mill built by the Niles Tool Works has just been added to its machine shop equipment for work on sheaves and pulleys, and additional machinery will be added in the spring.

H. N. Strait Mfg. Co., Kansas City, Mo., has gone into the manufacture of Corliss engines on an extensive scale in the past year, having expended about $150,000 in additions and improvements to its factory. A large amount of new machinery was purchased some months ago from the New Haven Mfg. Co., American Tool Works, and Bement, Miles & Co., and the plant, completely equipped with electric traveling cranes, of 25 tons capacity each, which were made in the company's own shops. Railroads have been heavy buyers of track scales of large capacity. Among the orders secured for engines are the following: J. R. Kelley Cooperage Co., Kansas City, Kan.; Southern Grain Co., Kansas City, Mo.; Loose Wiles C. & C. Co., Dallas, Tex.; H. F. Reniker, Miami, I. T.; J. M. Hadley,

De Soto, Kan.; Crystal Ice Co., Oklahoma City, O. T.; City Roller Mills, Emporia, Kan.; Coffeyville Shale Brick & Roofing Co., Coffeyville, Kan.; Pittsburg Brick & Pipe Co., Pittsburg, Kan. These engines run in sizes all the way from 12x36 to 22x42. The company is also figuring on two cross-compound condensing engines of 2,500 h. p. each for a large electric lighting plant, and has submitted specifications for a 3,000 h. p. cross-compound condensing engine for similar use at another point. It shipped a short time ago a large consignment of cooperage machinery to the Avalon Cooperage Co., St. Johns, Newfoundland, and is in receipt of the usual run of inquiries and orders for hay presses, etc., from Mexico.

Witte Iron Works Co., Kansas City, Mo., manufacturers of gas and gasoline engines, has doubled the capacity of its shops within the last two months to handle its increasing trade.

Woolley Foundry & Machine Works, Anderson, Ind., maker of the Burger type of automatic gas and gasoline engines, reports that it has more orders on its books today than it ever had before at one time, and is concerned not so much about new business as it is in getting material. Recent sales include one 100-h. p. gas engine to the Beaver Valley Clay Pot Co., Rochester, Pa., for power service; one 40-h. p. gas engine to Speyerer Hotel, Rochester, Pa., for electric lighting purposes; one 40-h. p. engine to the Canton Glass Co., Marion, Ind., for light service; one 50-h. p. engine to the Greenfield Fruit Jar & Bottle Co., Greenfield, Ind., for light and motor service; two 40-h. p. engines to Fairmount Glass Co., Fairmount, Ind., to drive gas compressors; one 15-h. p. engine to the Hill Tool Co., Anderson, Ind.; one 15-h. p. engine to Johnson-Reynolds Co., Anderson, Ind.; and one 40-h. p. engine to the Anderson Tool Co., Anderson, Ind., all three for electric lighting and motor work.

Gardner Governor Co., Quincy, Ill., reports that while it is not reaching out for new trade to any great extent, its regular customers are ordering with more frequency and in larger quantities than ever before. It is well satisfied with the trade outlook, having as much work on hand as its shops can comfortably handle.

Kearney & Trecker, Milwaukee, Wis., manufacturers of milling machines, etc., are well supplied with orders, customers crowding for delivery. Export trade amounts more orders on their books for foreign shipment. The capacity of the shop has been increased lately and several new tools added. The company employ about 75 men, exclusively on milling machine work.

Shultz Belting Co., St. Louis, Mo., report that business is very good, being better than in the same months of last year.

The Vilter Mfg. Co., Milwaukee, Wis., reports the receipt of a large number of orders for Corliss engines, ice making and refrigerating machinery, the larger proportion coming from eastern and central states. During the month a complete ice-making plant was shipped to South America.

The Chicago Pneumatic Tool Co., Chicago, has recently secured contracts through Heatly & Graham, Calcutta, India, for pneumatic plants to be installed in the Bengal-Nagpur Railroad shops and in the government dockyard at Bombay. The locomotive shops of Neilson Reid & Co., Glasgow, Scotland, are also to be equipped with pneumatic tools made by the Chicago firm.

Pawling & Harnischfeger, Milwaukee, state that the demand for cranes is as good during nearly the first two months of 1903 as at any time of the same period during 1902. While most of the orders come from the iron and steel industries of Pennsylvania and Ohio, yet the business from these industries in other sections is very satisfactory. Other lines of trade are buying freely, with numerous inquiries from industries that have heretofore barely entered the crane market. The foreign demand still remains quiet, though this firm finds the domestic market of such strength that business abroad need not be solicited. Among orders booked since Jan. 1 are the following: Chicago & Eastern Illinois R. R. Co., Danville, Ill., three cranes; Western Tube Co., Kewanee, Ill.; The Westinghouse Machine Co., East Pittsburg, Pa.; South Penn. Oil Co., Folsom, W. Va.; Pittsburg Plate Glass Co., Ford City, Pa.; Ansonia Brass & Copper Co., Torrington, Conn.; Fairbanks, Morse & Co., Beloit, Wis.; St. Paul Foundry Co., St. Paul; Ingersoll-Sergeant Drill Co., Phillipsburg, N. J., fourteen cranes; American Bridge Co., Ambridge Works, Economy, Pa., five cranes; Standard Steel Works, Burnham, Pa.; city of Boston, water department, Boston; Beloit Iron Works, Beloit, Wis.; International Steam Pump Co., Laidlaw-Dunn-Gordon works, Elmwood Place, O.; Wheeling Steel & Iron Co., Benwood, W. Va.; Coe Brass Mfg. Co., Torrington, Conn.; McConway & Torley Co., Pittsburg; Ironton Engine Co., Ironton, O., two cranes; Joseph T. Ryerson & Son, Chicago; Hammond Iron Works, Struthers, Pa.; Cambria Steel Co., Johnstown, Pa.; American Bridge Co., Pencoyd plant, Pencoyd, Pa.; C. A. Lawton & Co., De Pere, Wis.; Perry-Mathews-Buskirk Stone Co., Bedford, Ind., two cranes; Toledo Machine & Tool Co., Toledo; American Sheet Steel Co., Wellsville works, Wellsville, O.; Landis Tool Co., Waynesboro, Pa., three cranes; Goodman Mfg. Co., Chicago.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of their Wants:—

The Byard-Judd Co., Warren, O., capital $25,000, has been incorporated by W. C. Winfield, G. W. Byard, A. G. Judd, Warren Woods, Grant W. Byard, and C. F. Judd. Will manufacture sheet metal elbows, sheet metal and wire goods.

The Barberton Wire Lock Fence, capital $40,000, has been incorporated at Barberton, O., by Geo. A. Shaw, E. F. Barker, E. A. Miller, Jno. W. McCoy, M. R. Marker, Dr. T. E. Michener and Moretz Young.

The Little Giant Hose Bridge & Grey Iron Co., capital $24,000, has been incorporated at Dennison, O., by A. W. Elson, John W. Wagner, Geo. H. Frazier, Harry G. Isenberg and Jas. Lewis. Will manufacture, buy and sell iron castings.

The recent application for a charter made to the State of Pennsylvania, under the name of Pennsylvania Hardware Co., was withdrawn and the name of Keystone Hardware Co. substituted. This was done owing to the similarity of the name of the Penn Hardware Co., of Reading, and to avoid confusion. The Keystone Hardware Co., Reading, Pa., was organized and has purchased the plant of Rick Bros., of Reading, who were manufacturing certain lines of hardware. The intention is to increase the output of this plant.

The Coates Mfg. Co., Portland, Me., incorporated with a capital of $100,000, will manufacture and deal in machinery.

The Cleveland Automatic Molding Machine Co. has been incorporated; capital, $100,000; incorporators, J. N. Battenfeld and George F. Kast, Cleveland, O., and L. A. Ritzmon, Glenville, O.

Through the efforts of George T. Alter, Cincinnati capital has been interested in a company to be known as the American Structural Iron Co., with a capitalization of $250,000. The stockholders include A. T. Hazen, contractor; George R. Scrugham, S. L. Snodgrass, and J. G. Luers. The officers and directors of the company will be elected this week and steps taken looking to the erection of a $75,000 factory on a site already secured in Hunt street, along the C., L. & N. Railroad. George T. Alter is to be the president of the new company.

The Empire Patent Puddling Furnace Co. has been incorporated under the laws of New Jersey by Wm. Kent and others, of Youngstown, O., where the furnace will be manufactured.

The Manitoba Iron Works, Rat Portage, Manitoba, have been incorporated with a capital of $150,000.

Patterson Iron Mining Co., Baraboo, Wis., has been incorporated; capital stock, $100,000; incorporators, Mark L. Patterson, John P. Witwer, Frank B. Clark.

The Southern Iron & Coal Co., Atlanta, Ga., will be incorporated by H. F. Van Deventer, W. F. Cowham, H. B. Camp, and T. J. Flournoy, to acquire coal, iron and other

mineral lands in Georgia, and to develop water powers and private railways.

The Consolidated Fence Supply Co., Portland, Ore., has been incorporated by George T. Murton, S. B. Linthicum and H. H. Parker; capital, $500,000; to deal in steel, iron, wire, wood, fence gates, etc.

The Crowe Coal & Iron Co., Birmingham, Ala., has been incorporated with a capital of $10,000.

The Gillies Launch & Engine Co., Almonte, Canada, incorporated with a capital of $100,000, succeeds the John Gillies Estates Co., in the manufacture of gasoline and steam engines, launches, mill machinery, etc. Additional machinery is to be installed.

The Connecticut Tool Co., Bridgeport, Conn., has been incorporated with a capital of $34,000.

The Murray Iron Works, of Burlington, Ia., have increased the capital stock from $100,000 to $150,000.

The Russell Wheel and Foundry Co., of Detroit, has filed notice of an increase of capital from $275,000 to $350,000.

The Eulaton Foundry Co., Anniston, Ala., has been incorporated with a capital of $10,000.

Citizens of Waycross, Ga., have subscribed $100,000 to establish a plant for the manufacture of cars. The name of the new company will be the South Atlantic Car & Mfg. Co. A site has been purchased and the building of the plant will soon be commenced. The provisional directors are: George Dole Wadley, A. Sessoms, G. R. Youmans, J. M. Cox, W. A. Price, L. Johnson, J. S. Bailey, H. Murphy, and P. N. Harley.

Nature's Own Never-Slip Horseshoe Co., Philadelphia, has been incorporated with capital of $125,000 to manufacture horseshoes, by George A. Wardell, Dennis B. Ryan, and Henry W. Runyon.

Fires and Accidents:—

A large part of the plant of the J. I. Case Plow Works, Racine, Wis., was destroyed by fire Feb. 24. Loss, $75,000.

The American Specialty Works, Erie, Pa., were totally destroyed by fifire Feb. 27. Loss $25,000, covered by insurance.

New Construction:

The Central Electrical Construction Co., Youngstown, O., recently incorporated, will manufacture electrical specialties of every description, also small motors, and a general line of brass goods. The company will do stamping of every description in brass and sheet steel in the line of novelties and specialties. It is also the intention to establish a large jobbing house for the purpose of supplying the mills and other trade of its section of the country. The company will erect a building 120x60 feet, and will equip it with new and modern machinery throughout. The machinery will be driven by electric motors exclusively from a direct connected generator.

The Washington Iron Works, Seattle, Wash., will erect a two story machine shop, 70x240 feet. A part of the machinery has been purchased. Total cost, about $100,000.

The Fort Wayne Foundry & Machine Co. will soon build an addition to its plant in Chicago, preparatory to engaging in the manufacture of car wheels. The extension will involve an expenditure of $200,000.

The organization of the Avonmore Construction Co., Avonmore, Pa., has been completed, and work upon the plant will commence at once. This will be one of the best equipped plants in the country for furnishing both horizontal and water tube boilers, plate iron and structural work for oil refineries, steel plants, foundries, blast furnaces and rolling mills. J. Harrison Orwig will be manager.

The plant of the Alexandria Iron Works, Alexandria, Va., which was damaged by fire Jan. 13, has been rebuilt and is now running full time.

The building of the Hammond Iron Works, Warren, Pa., now under course of construction, will be about 82 feet wide and 196 feet long. It will be equipped with an electric crane and other improved machinery.

G. D. Berry, president of the Berry Electric & Mfg. Co., St. Joseph, Mo., is considering the establishment of a malleable plant which will require new equipment.

The concession recently granted by the Mexican government for the building of car shops in Mexico City was obtained by Isaac M. Hutchison, who represents the Mexican interests of the American Steel Foundries, American Locomotive Co., and other prominent concerns. The organization of a company with a capital of $1,000,000 is expected to be completed this month. American capital is to be largely interested. The building of the plant will soon be begun.

Plans for the proposed shops of the Rock Island R. R. at Moline, Ill., call for the following buildings: One machine shop and boiler shop, 248x276 feet in area; five shops for painting and other purposes, each 512x160; a store room, 500x100; oil house, 100x60; planing mill, 301x197; brass foundry, 88x90, and a lumber house 250 feet long. Plans for the locomotive works have not as yet been drawn, but it is understood that they will be of large proportions as the company expects to turn out a large number of locomotives for the several divisions.

The Barnett File Works, Philadelphia, will erect a two story brick shop 44x196 feet, a one story engine and boiler house 80x36 feet and a grindstone shed 51x75 feet.

The management of the Marion Malleable Iron Works, Marion, Ind., has announced that the plant will remain permanently in that city regardless of the supply of gas. A gas producing plant will be installed. It is also the intention to add a 14-ton melting furnace.

The Railway Supply & Foundry Co., of Harvey, Ill., whose plant was destroyed by fire Feb. 2, has contracted with the Chicago Heights Land Association for the construction of a new plant at Chicago Heights, Ill. The main building will be 100x300, the two wings 50x150 with separate boiler and engine house, all with stone foundations, brick superstructure and metal roofs. The main building is to be equipped with two 20-ton electric traveling cranes.

The Sheffield Car Co., of Three Rivers, Mich., is erecting an addition 90x100 feet.

Loffland Bros. & Kavanaw have started the erection of a $15,000 machine shop at Macksburg, Washington county, Ohio.

The Great Northern R. R. has 400 men at work, 200 at night and 200 in daytime on its new ore dock at Allouez bay. The dock will be 900 feet long and have 80 pockets.

The John F. Byers Machine Co., Ravenna, O., has already perfected plans and placed orders for material to rebuild its boiler plant, which was destroyed by fire Feb. 18. The plant will be about double the capacity of the old one. As yet the insurance adjusters have not appeared and the company has not had time to examine tools and does not know whether it will need to replace them with new ones or not. It hopes to have the new plant running inside of 40 days.

The Whitney Car Wheel Co., Camden, N. J., has had plans prepared for a new plant. They provide for a wheel foundry structure, 40 feet high, measuring 176 by 98 feet; an engine and boiler house, 56 by 56 feet, with a steel stack 125 feet high; a machine and pattern shop, 50 by 85 feet; a chemical laboratory, 40 by 40, and a one story office, 53 by 20. The buildings will all be of brick, and are to be fitted up with all modern equipment. The cost will be over $100,000.

The Capelle Fan Works, Fort Pitt, Pa., which were destroyed by fire Feb. 25, with the exception of the stock room, pattern shop and foundry, which were saved, will be rebuilt on a larger scale.

M. A. Ryan, proprietor of the Northwestern Boiler Works, Duluth, Minn., which were recently destroyed by fire, will soon begin the erection of a three-story structure to take the place of the old plant. Orders are now being taken care of by the National Boiler Works, of Superior, which are also owned by Mr. Ryan.

The Pittsburg District:—

Contracts have been awarded by the American Sheet Steel Co. for extensive improvements to be made at their Wellsville, O., and McKeesport, Pa., plants. A steel building will be erected 260 feet long which will house four new cold mills, the contracts for which were awarded some time ago, to be added to the Wellsville plant. Three new hot mills are to be added to the McKeesport plant and will be completed early next fall.

On March 15 the Union Steel Co. will pass out of existence and the offices occupied by this company in the Frick Building will be taken over by the Pittsburg district sales department of the American Steel & Wire Co. now located in the Tradesmens building.

The George A. Fuller Co., of New York, was awarded the contract last week for erecting the new station and terminal of the Wabash railroad in Pittsburg. The contract price was $750,000. It is estimated that 5,000 tons of structural material will be used, and it will probably be furnished by the American Bridge Co.

Owing to the alleged employment of non-union labor in the erection of the false work for the Wabash bridge to span the Monongahela river, Pittsburg, the structural iron workers employed by this company throughout the entire Pittsburg district went on a strike last week. The structural iron workers claim that they have an agreement with the American Bridge Co. which calls for the employment of only union labor on any job where structural workers are at work. Work throughout the entire district has been tied up and much new construction at iron and steel plants is being seriously delayed.

"Potterville," the colony in the yards of the Homestead Steel Works, Homestead, Pa., erected a short time prior to the Homestead strike in 1892, is to be wiped out of existence to make room for the erection of the new plate mill in connection with this plant. This colony comprises about 100 small houses which will be torn down immediately. They are occupied at present by laborers employed in the mills.

The Westinghouse Air Brake Co. will erect a large brass foundry at Wilmerding for the purpose of manufacturing a car buffer recently patented. The building will be 320 feet long and 60 feet wide and when completed will house one of the largest brass foundries in this district.

The second annual meeting of the stockholders of the Pittsburg Valve, Foundry & Construction Co. was held last week at the company's offices in Pittsburg and re-elected Henry M. Atwood, Joseph T. Speer, Charles A. Anderson, Moses Atwood and R. J. Wilson directors, and also enlarged the directorate by the election of two new directors, John McCaffrey and Charles R. Rhodes, making the number of directors seven instead of five as before. Henry M. Atwood was re-elected chairman of the board; Mr. Speer, president; Mr. Anderson, treasurer, and Moses Atwood, vice president.

members shall be cut true to line and flush with each other?

William Swindell & Bros., German National Bank Building, Pittsburg, have completed this week the furnace equipment for the new twelve mill sheet plant of the Sharon Steel Co., also the furnace equipment for the open-hearth and bar mill plant of the Sharon Steel Hoop Co., Sharon, Pa. They are working on a new tube plant for the Page-Hersey Iron & Tube Co., Guelph, Ont., two separate furnace plants for the General Electric Co., Schenectady, N. Y., the furnace equipment for the new Columbia Steel Co., Elyria, O., the Adams Crucible Steel Co., Redington, Pa., C. G. Hussey & Co., Pittsburg, and the Superior Steel Co., Carnegie, Pa. They are also installing over one hundred Swindell patent water seal gas producers in glass plants in Ohio, Indiana and Illinois.

Dravo, Doyle & Co., merchant engineers, Lewis block, Pittsburg, report the following sales among business closed in the past two months: Cochrane heaters.—Pittsburg Brewing Co., 450 h. p. special; Kenney & Co., Scottdale, Pa., 200 h. p. special; Sharon Coke Co., Ronca, Pa., 850 h. p. standard; Cleveland Laundry Co., Cleveland, 150 h. p. standard; U. S. Coal & Coke Co., Pittsburg, 1,800 h. p. standard; Elyria Stone Co., Elyria, O., 200 h. p. standard; Barton Coal Co., Cleveland, 450 h. p. standard; Citizens' Light, Heat & Power Co., Johnstown, Pa., 1,800 h. p. standard; Canton Brewing Co., Canton, O., 300 h. p. standard; Cleveland Worsted Mills Co., Cleveland, 2,000 h. p. special; Morreau Gas Fixture Co., Cleveland, 150 h. p. special; Cambria Steel Co., Johnstown, Pa., 2,500 h. p. standard; Pittsburg Railways Co., 1,250 h. p. standard; Sorge-Cochrane system of feed water heating and purifying.—Struthers Furnace Co., Struthers, O., 900 h. p. system; United States Coal & Coke Co., 450 h. p. system; H. W. Oliver Central power plant, 2,000 h. p. system; Ball Engines—Duquense Brewing Co., Pittsburg, one 14x12 d. c.; Central Connellsville Coke Co., one 11x10 belted; Washington Electric Light & Power Co., one 18x16 belted; Monongahela Valley Electric Co., one 20x12 belted; Kilby Mfg. Co., four 9½x10 d. c.; four 11x12 d. c, two 15x14 d. c., four 19x17 d. c.; Morreau Gas Fixture Co., one 16x14 d. c.; United States government, one 7x8 Erieco engine d. c., one 9x10 d. c., Erie engine works, one 10 K. W. Westinghouse engine type generator and complete equipment, including switchboard, chandeliers, etc. Larry equipment: One 37½ K. W. Westinghouse belted generator, switchboard, motors, etc. They have also had quite an extensive sale of boilers and Cochrane separators, ranging from 4-inch to 20-inch.

The Pennsylvania Railroad Company has begun the erection of a large steel structural fitting shop at Altoona, Pa., which is to be used in the erection of steel cars and the repair of cars now in service. The building will be 900 feet long and 500 feet wide.

A special meeting of the stockholders of Kenney & Co., Scottdale, Pa., will be held on April 30, for the purpose of considering a proposition to increase the capitalization from $125,000 to $200,000.

During the past six months the plant has been greatly increased in size and owing to the cost of these improvements and the fact that more working capital is required this increase to the capital stock is to be made.

At a two-day session of the executive board of the International Association of Blast Furnace Workers and Smelters, held at Youngstown, O., last week, the question of again demanding an eight-hour day this spring was considered but no action was taken. The matter was again referred back to the various lodges of blast furnace workers for a vote and the executive committee will abide by the decision. The question of asking an advance in wages will also be voted upon by the lodges.

The Pennslyvania Engineering Works, New Castle, Pa., is building ten 50-ton ladle cars for the Tennessee Coal, Iron & Railroad Co., for shipment to its steel plant at Ensley, Ala.

The plant of the Steel & Iron Aluminum Coating Co., Connellsville, Pa., resumed operations this week after being shut down for a brief period. A new coating machine ordered several months ago has been installed. The company has a large accumulation of orders which must be filled at an early date and it is probable that some additions will be made to the plant in the near future as the demand for aluminum coated sheets is steadily growing.

The annual banquet of the Engineers' Society of Western Pennsylvania was held on Friday evening, Feb. 27, at the Hotel Schenley, Pittsburg. About 400 engineers were in attendance and the affair was one of the most successful yet held by the society. Dr. Walther Riddle served as toastmaster and toasts were responded to as follows: Victor Beutner, "What are we here for;" G. B. Ely, "German and American Engineering Tendencies;" Joseph Ramsey, Jr., "Railroads;" "Theory and Practice," Prof. S. B. Kinter; and "The Vicissitudes of an Engineer's Life," Harry J. Lewis. A structural section of the society was organized at a special meeting of those interested last week and a meeting to organize this section will be held shortly.

Pittsburg coal producers have decided on the following prices on their product at lower lake ports this season. One and one-quarter-inch screened lump $2.55; ¾-inch screened lump $2.45 and run of mine $3.35. The Hocking Valley operators have announced a list of 15 cents per ton all around. Operators in other fields are expected to line up to these prices maintaining the old differentials. The advance is about 50 cents per ton all around.

The incorporation of the Lefferts' Galvanizing Works, New York City, makes no change in the ownership. Some extensions will be built with the additional capital.

Over $67,000,000 will be spent during the next two years by the Pennsylvania railroad to relieve the congestion between Pittsburg and Philadelphia, and to provide further facilities for the enormously increased tonnage that will be offered. This statement was made by President A. J. Cassatt in his annual report to the stockholders issued last week. He pointed out that the tonnage on lines east and west of Pittsburg last year was 270,000,000, or an increase for the year of over 26,000,000 tons. This stupendous tonnage promises to be largely increased this year, and extraordinary improvements are necessary to prevent complete congestion. About half of the total will be expended in the Pittsburg district.

The Allis-Chalmers Co. is increasing its manufacturing facilities in the flour mill and saw mill departments at Milwaukee, this being necessary under the large volume of business enjoyed by these two departments at the present time.